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TRANSACTIONS

OF THE

COLLEGE OF PHYSICIANS

OF

PHILADELPHIA.

THIRD SERIES.

VOLUME THE EIGHTEENTH.

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1896.

NOTICE.

The present volume of TRANSACTIONS contains the papers read before the College from January, 1896, to December, 1896, inclusive.

The Committee on Publication thinks it proper to say that the College holds itself in no way responsible for the statements, reasonings, or opinions set forth in the various papers published in its TRANSACTIONS.

EDITED BY
GWILYM G. DAVIS.

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1896.

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1787	JOHN REDMAN
1805	WILLIAM SHIPPEN
1809	ADAM KUHN
1818	THOMAS PARKE
1835	THOMAS C. JAMES
1835	THOMAS T. HEWSON
1848	GEORGE B. WOOD
1879	W. S. W. RUSCHENBERGER
1883	ALFRED STILLÉ
1884	SAMUEL LEWIS
1884	J. M. DA COSTA
1886	S. WEIR MITCHELL
1889	D. HAYES AGNEW
1892	S. WEIR MITCHELL
1895	J. M. DA COSTA

FELLOWS

OF THE

COLLEGE OF PHYSICIANS OF PHILADELPHIA.

DECEMBER, 1896.

* Non-resident Fellows.
† Fellows who have commuted dues.

ELECTED.

*1883. Abbot, Griffith E., Ph.D., M.D., Washington, D. C.

1892. Abbott, Alex. C., M.D., Professor of Hygiene, and Director of Laboratory of Hygiene, University of Pennsylvania.

1870. Adler, John M., M.D.

1876. Alison, Robert H., M.D.

1867. Allen, Harrison, M.D., Professor of Zoölogy and Comparative Anatomy in the University of Pennsylvania.

1873. Allis, Oscar H., M.D., Clinical Lecturer on Orthopædic Surgery in Jefferson Medical College, and Surgeon to the Hospital of the same; Surgeon to the Presbyterian Hospital.

1896. Allyn, Herman B., M.D., Instructor in Physical Diagnosis in the University of Pennsylvania; Visiting Physician to St. Joseph's Hospital; Medical Registrar, Philadelphia Hospital.

1888. Anders, James M., M.D., Professor of Hygiene and Clinical Diseases of Children in the Medico-Chirurgical College, Philadelphia; Physician to the Philadelphia Hospital.

1869. Andrews, T. Hollingsworth, M.D., Consulting Surgeon to the Hospital of the Good Shepherd, Radnor; Medical Director of the Bureaus of Police and of Fire in the Department of Public Safety.

1896. Angney, William M., M.D.

*1882. Ashbridge, Richard, M.D., West Whiteland, Pa.

1863. Ashhurst, John, Jr., M.D., LL.D., Barton Professor of Surgery and Professor of Clinical Surgery in the University of Pennsylvania; Surgeon to the Pennsylvania Hospital and to the Children's Hospital; Consulting Surgeon to St. Christopher's Hospital, to the Woman's Hospital, and to the Hospital of the Good Shepherd, Radnor.

1865. Ashhurst, Samuel, M.D., Surgeon to the Children's Hospital.

1893. Ashton, Thomas G., M.D., Chief of Out-patient Medical Department, Jefferson Medical College Hospital; Demonstrator of Clinical Medicine, Jefferson Medical College; Visiting Physician to St. Mary's Hospital, Philadelphia.

1857. Atlee, Walter Franklin, A.M., M.D., Corresponding Member of La Société des Sciences Médicales de Lyons; Consulting Surgeon to St. Luke's Hospital, Bethlehem; Visiting Physician to the Preston Retreat.

1852. Bache, Thomas Hewson, M.D.

1883. Baer, Benjamin, F., M.D., Professor of Gynecology in the Philadelphia Polyclinic.

†1892. Baker, George Fales, B.S., M.D., Surgeon to Out-patient Department of St. Joseph's Hospital.

1879. Baker, Washington H., M.D., Obstetrician to the Maternity Hospital.

1889. Baldy, John Montgomery, M.D., Professor of Gynecology in the Philadelphia Polyclinic; Surgeon to the Gynecean Hospital and to the Gynecological Out-patient Department of the Pennsylvania Hospital.

1880. Bartholow, Roberts, M.D., Professor (Emeritus) of Materia Medica, General Therapeutics and Hygiene in Jefferson Medical College.

1894. Barton, James M., M.D., Surgeon to the Jefferson Medical College Hospital and to the Philadelphia Hospital.

1883. Baum, Charles, A.M., M.D., Ph.D.

1873. Baxter, H. F., M.D.

1883. Beates, Henry, M.D.

1860. Benner, Henry D., M.D.

1874. Bennett, W. H., M.D., Physician-in-charge to the Children's Seashore House for Invalid Children, and to the Seaside House for Invalid Women, Atlantic City.

1896. Beyea, Henry D., M.D., Instructor in Gynecology and Assistant Demonstrator of Obstetrics in the University of Pennsylvania; Assistant Surgeon to the Gynecean Hospital.

†1884. Biddle, Alexander W., M.D.

1884. Biddle, Thomas, M.D.

*1866. Black, J. J., M.D., New Castle, Del.

1894. Bliss, Arthur Ames, M.D., Laryngologist to the German Hospital; Laryngologist and Aurist to the Pennsylvania Institution for the Deaf and Dumb.

*1867. Boardman, Charles H., M.D., Boston, Mass.

1894. Bochrocii, Max H., Instructor in Electro-therapeutics and Chief Clinical Assistant in the Nervous Department, Jefferson Medical College Hospital.

1896. Boger, John A., M.D., Surgeon to St. Mary's Hospital; Surgeon to the Samaritan Hospital; Surgeon to the Dispensary of the Episcopal Hospital.

1891. Boyd George M., M.D., Physician to the Philadelphia Lying-in Charity; Assistant Surgeon to the Kensington Hospital for Women.

†1884. Bradford, Thomas Hewson, M.D., Physician to the Dispensary of the Children's Hospital and Surgeon to the Gynecological Out-patient Department of the Pennsylvania Hospital.

1856. Brinton, John H., M.D., Professor of the Practice of Surgery and of Clinical Surgery in the Jefferson Medical College; Consulting Surgeon to the Southwestern Hospital of Philadelphia.

1891. Brinton, Lewis, M.D., Visiting Physician to the Nervous Department of the Howard Hospital.

1887. Brubaker, Albert P., M.D., Professor of Physiology and General Pathology in the Pennsylvania College of Dental Surgery; Demonstrator of Physiology in Jefferson Medical College; Lecturer on Anatomy and Physiology at the Drexel Institute.

*1890. Brush, Edward N., M.D., Medical Superintendent of the Shepherd Asylum, Towson, Md.

*1851. Bullock, William R., M.D., Wilmington, Del.

1887. Bunting, Ross R., M.D.

1870. Burnett, Charles H., M.D., Professor (Emeritus) of Otology in the Philadelphia Polyclinic; Clinical Professor of Otology

in the Woman's Medical College; Aural Surgeon, Presbyterian Hospital; and Consulting Aurist to the Pennsylvania Institution for the Deaf and Dumb, West Philadelphia Hospital for Women, and the Bryn Mawr Hospital.

1892. Burr, Charles W., M.D., Clinical Professor of Nervous Diseases, Medico-Chirurgical College; Professor of Mental and Nervous Diseases, Philadelphia Polyclinic.

1886. Cadwalader, Charles E., M.D.

1895. Carey, William A., M.D.

1895. Carpenter, John T., M.D., Adjunct Professor of Diseases of the Eye, Philadelphia Polyclinic; Assistant Surgeon to Wills Hospital; Ophthalmologist to the New Jersey Training School, Vineland, N. J.

1892. Cattell, Henry W., M.D., Demonstrator of Morbid Anatomy in the University of Pennsylvania; Pathologist to the Presbyterian Hospital.

*1892. Cerna, David, M.D., Ph.D., Galveston, Texas; Demonstrator of Physiology in the Department of Medicine of the University of Texas; Corresponding Fellow of the Sociedad Española de Higiene of Madrid.

1885. Chapin, John B., M.D., Physician to the Pennsylvania Hospital for the Insane.

1880. Chapman, Henry C., M.D., Professor of the Institutes of Medicine and of Medical Jurisprudence in Jefferson Medical College.

1868. Cheston, D. Murray, M.D.

1873. Clark, Leonardo S., M.D.

1872. Cleemann, Richard A., M.D.

1896. Cleveland, Arthur H., M.D., Clinical Professor of Laryngology in the Medico-Chirurgical College; Surgeon-in-charge of Ear, Nose, and Throat Dispensary, Presbyterian Hospital.

*1842. Clymer, Meredith, M.D., New York.

1871. Cohen, J. Solis, M.D., Professor (Emeritus) of Diseases of the Throat and Chest in the Philadelphia Polyclinic; Professor (Honorary) of Laryngology in Jefferson Medical College; Consulting Physician to the Home for Consumptives, Philadelphia.

1888. Cohen, Solomon Solis, M.D., Professor of Clinical Medicine and Therapeutics in the Philadelphia Polyclinic; Lecturer

on Clinical Medicine in the Jefferson Medical College; Physician to the Philadelphia Hospital, to the Rush Hospital, and to the Polyclinic Hospital; Consulting Physician to the Jewish Hospital; Consulting Laryngologist to the Pennsylvania Training School for Feeble-minded Children.

1895. Cross, William A., M.D.

1866. Cruice, R. B., M.D., Surgeon to St. Joseph's Hospital.

1884. Curtin, Roland G., M.D., Lecturer on Physical Diagnosis in the University of Pennsylvania; Assistant Physician to the University Hospital; Physician to the Philadelphia and Presbyterian Hospitals.

1884. Da Costa, John C., M.D., Gynecologist to Jefferson Medical College Hospital and to St. Agnes's Hospital.

1896. Da Costa, John Chalmers, M.D., Surgeon to the Philadelphia Hospital; Demonstrator of Surgery in Jefferson Medical College; Chief Assistant Surgeon to the Hospital of Jefferson Medical College; Surgeon to Elwyn Institution for the Feeble-minded.

†1858. Da Costa, J. M., M.D., LL.D., Professor (Emeritus) of the Principles and Practice of Medicine in Jefferson Medical College; Physician to the Pennsylvania Hospital; Consulting Physician to the Children's Hospital and to the Northern Dispensary.

1887. Daland, Judson, M.D., Instructor in Clinical Medicine and Lecturer on Physical Diagnosis in the University of Pennsylvania; Assistant Physician to the Hospital of the University of Pennsylvania; Director of the Stetson Laboratory of Hygiene.

1859. Darrach, James, M.D., Consulting Surgeon to the Germantown Hospital.

1896. Davis, Charles N., M.D., Assistant Physician to the Dispensary for Diseases of the Skin, and Assistant Surgeon in the Dispensary for Genito-urinary Diseases in the Hospital of the University of Pennsylvania; Physician to the Department for Skin Diseases, Northern Dispensary.

1888. Davis, Edward P., M.D., Professor of Obstetrics and Diseases of Infancy in the Philadelphia Polyclinic; Clinical Professor of Obstetrics in the Jefferson Medical College; Clinical Professor of Pædiatrics in the Woman's Medical

College; Visiting Obstetrician to the Philadelphia Hospital; Physician to the Children's Department of the Howard Hospital; Member of the American Gynecological Society and of the American Pædiatric Society.

1889. Davis, Gwilym G., M.D., M.R.C.S. Eng., Surgeon to the Episcopal and St. Joseph's Hospitals; Surgeon to the Orthopædic Hospital; Assistant Demonstrator of Surgery in the University of Pennsylvania.

1874. Deakyne, A. C., M.D.

1894. Deaver, Henry C., M.D., Surgeon to the Episcopal and St. Mary's Hospitals and to St. Christopher's Hospital for Children.

1887. Deaver, John B., M.D., Assistant Professor of Applied Anatomy in the University of Pennsylvania; Attending Surgeon to the German and Philadelphia Hospitals; Consulting Surgeon to St. Agnes's, Germantown, and St. Timothy's Hospitals.

1892. Deaver, Richard Wilmot, M.D.

1885. Dercum, Francis X., M.D., Clinical Professor of Neurology in Jefferson Medical College; Neurologist to the Philadelphia Hospital.

1891. Dixon, Samuel G., M.D., President and Executive Curator of the Academy of Natural Sciences of Philadelphia; Director of the Philadelphia Zoölogical Society; Manager of the Ludwick Institution.

1891. Dixon, William C., M.D., Physician to the Industrial Home for Blind Women, Philadelphia; Physician to the Shelter for Colored Orphans, Philadelphia; Member of Consulting Staff, Philadelphia Home for Incurables; Examiner of Insane Patients, Philadelphia Hospital.

1896. Donnellan, P. S., M.D., L.R.C.P. and S., Ireland; Lecturer on Physical Diagnosis in the Medico-Chirurgical College of Philadelphia; Visiting Physician to St. Mary's Hospital; Clinical Assistant, Throat Department, Philadelphia Polyclinic; Medical Examiner, Mutual Life Insurance Company of New York.

1893. Downs, Norton, M.D.

1864. Downs, R. N., M.D.

1884. Drysdale, T. M., M.D.

1864. Duer, Edward L., M.D., Accoucheur to the Philadelphia

Hospital; Surgeon to the Maternity Hospital; Visiting Physician to the Preston Retreat.

1871. Duhring, L. A., M.D., Professor of Skin Diseases in the University of Pennsylvania.

1881. Dulles, Charles Winslow, M.D., Lecturer on the History of Medicine, University of Pennsylvania; Surgeon to Rush Hospital; Surgeon in the Gynecological Dispensary, Presbyterian Hospital.

1863. Dunglison, Richard J., M.D.

*1871. Dunglison, Thomas R., M.D., Paris, France.

1888. Dunn, Thomas D., M.D.

*1849. Dunott, Justus, M.D., Harrisburg, Pa.

1860. Dunton, William R., M.D., Consulting Physician to the Germantown Hospital.

*1882. Edwards, Joseph F., M.D., Atlantic City, N. J.

*1887. Edwards, William A., M.D., San Diego, California.

1896. Ely, Thomas C., M.D.

1893. Eshner, Augustus A., M.D., Professor of Clinical Medicine in the Philadelphia Polyclinic; Physician to the Philadelphia Hospital.

*1880. Eskridge, J. T., M.D., Denver, Colorado.

1868. Evans, Horace Y., M.D., Physician to the Charity Hospital.

1894. Faries, Randolph, M.D., Surgeon to the Orthopædic Dispensary of the Hospital of the University of Pennsylvania; Director of Physical Education, University of Pennsylvania and Protestant Episcopal Academy, Philadelphia.

1893. Farr, William W., M.D., Surgeon to the Dispensary of the Episcopal Hospital; Visiting Physician to the Sheltering Arms and to the Church Home for Children.

1884. Fenton, Thomas H., M.D., Medical Director and Senior Ophthalmologist of the Union Mission Hospital; Ophthalmologist to St. Vincent's Home and to the Home for Aged Couples.

1866. Fischer, Emil, M.D.

1884. Fisher, Henry M., M.D., Physician to the Episcopal Hospital; Microscopist to the Pennsylvania Hospital and Physician to the Out-patient Department of the same.

1888. Flick, Lawrence F., M.D.

1862. Forbes, William S., M.D., Professor of Anatomy in Jefferson Medical College.

1870. Ford, William H., M.D., President of the Board of Health of Philadelphia; Physician to the Foster Home.

†1885. Fox, Joseph M., M.D., Leesburg, Va.

1890. Freeman, Walter J., M.D., Professor of Laryngology in the Philadelphia Polyclinic; Laryngologist to the Outpatient Department of the Children's Hospital; Consulting Laryngologist to the Pennsylvania Institution for the Deaf and Dumb.

1885. Fricke, Albert, M.D.

1893. Friebis, George, M.D., Ophthalmic Surgeon to the Mary Drexel Home and to the German Hospital.

1889. Fussell, M. Howard, M.D., Chief Physician to the Medical Dispensary of the Hospital of the University of Pennsylvania; Instructor in Clinical Medicine in the University of Pennsylvania.

1873. Gerhard, George S., M.D.

1864. Getchell, F. H., M.D.

1892. Gibb, Joseph S., M.D., Adjunct Professor of Diseases of the Throat and Nose in the Philadelphia Polyclinic; Surgeon to the Ear, Nose, and Throat Department of the Episcopal Hospital.

1885. Girvin, Robert M., M.D., Gynecologist to the Presbyterian Hospital.

1889. Githens, William H. H., M.D., Visiting Physician to the Sheltering Arms.

1894. Gleason, E. Baldwin, M.D., Clinical Professor of Otology in the Medico-Chirurgical College; Surgeon-in-charge of the Nose, Throat, and Ear Department, Northern Dispensary.

*1893. Gobrecht, William, M.D., Washington, D. C.

1884. Godey, Harry, M.D.

1893. Goodell, W. Constantine, M.D., Clinical Instructor in Gynecology in the University of Pennsylvania; Assistant Gynecologist, University Hospital.

1894. Graham, Edwin E., M.D., Clinical Professor of Diseases of Children in the Jefferson Medical College; Physician to the Franklin Reformatory Home.

1885. Graham, John, M.D.

1891. Green, Walter D., A.M., M.D., Out-patient Surgeon to the Pennsylvania, Children's, and Methodist Hospitals; Assistant Surgeon to the Gynecean Hospital.

1870. Grier, M. J., M.D.

1883. Griffith, J. P. Crozer, M.D., Clinical Professor of the Diseases of Children in the University of Pennsylvania; Professor of Clinical Medicine in the Philadelphia Polyclinic; Physician to St. Agnes's, the Children's, the Howard and the Rush Hospitals.

1871. Grove, John H., M.D., Surgeon to St. Mary's and St. Agnes's Hospitals.

1889. Guitéras, John, M.D., Professor of General Pathology and Morbid Anatomy in the University of Pennsylvania.

*1893. Hamill, Robert H., M.D., Summit, N. J.

1894. Hamill, Samuel McC., Demonstrator of Physical Diagnosis, University of Pennsylvania; Assistant Physician to the Medical Dispensary of the Hospital of the University of Pennsylvania; Visiting Physician to the Baptist Orphange.

*1859. Hammond, William A., M.D., Surgeon-General U. S. A. (Retired), Washington, D. C.

1886. Hansell, Howard F., M.D., Clincial Professor of Ophthalmology, Jefferson Medical College; Professor of Diseases of the Eye, Philadelphia Polyclinic; Consulting Ophthalmologist, Chester County Hospital; Ophthalmologist, Frederick Douglass Memorial Hospital.

1889. Hare, Hobart A., M.D., Professor of Therapeutics in Jefferson Medical College; Physician to St. Agnes's Hospital and to Jefferson Medical College Hospital.

1865. Harlan, George C., M.D., Surgeon to Wills Eye Hospital and to the Eye and Ear Department of the Pennsylvania Hospital; Professor (Emeritus) of Diseases of the Eye in the Philadelphia Polyclinic.

1862. Harris, Robert P., M.D.

1885. Harte, Richard H., M.D., Surgeon to Pennsylvania Hospital; Surgeon to Episcopal Hospital; Surgeon to St. Mary's Hospital; Consulting Surgeon to St. Timothy's Hospital; Demonstrator of Osteology, University of Pennsylvania.

1851. Hartshorne, Henry, M.D., LL.D.

1888. Hartzell, Milton B., M.D., Instructor in Dermatology,

University of Pennsylvania; Dermatologist to the Methodist Episcopal Hospital.

1872. Hays, I. Minis, M.D.

1882. Hearn, W. Joseph, M.D., Surgeon to the Hospital of Jefferson Medical College and to the Philadelphia Hospital.

1884. Henry, Frederick P., M.D., Physician to the Philadelphia Hospital; Professor of the Principles and Practice of Medicine in the Woman's Medical College of Pennsylvania.

1891. Hewson, Addinell, A.M., M.D., Demonstrator of Anatomy in Jefferson Medical College; Dispensary Surgeon to the Hospital of the Protestant Episcopal Church.

1872. Hinkle, A. G. B., M.D.

1892. Hinsdale, Guy, M.D., Physician to the Presbyterian Orphanage and to the Out-patient Department of the Presbyterian Hospital; Assistant Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases.

1888. Hirsh, Abram B., M.D., Physician to Charity Hospital.

1888. Hirst, Barton Cooke, M.D., Professor of Obstetrics in the University of Pennsylvania; Obstetrician to the Philadelphia Hospital and to the Maternity Hospital.

1894. Hoch, William R., M.D., Instructor in Laryngology, University of Pennsylvania; Laryngologist to Rush Hospital, and to Methodist Episcopal Hospital.

1885. Holland, James W., M.D., Professor of Medical Chemistry and Toxicology in Jefferson Medical College.

†1879. Hopkins, William Barton, M.D., Surgeon to the Pennsylvania Hospital.

1867. Horn, George H., M.D., Professor of Entomology in the Biological Department of the University of Pennsylvania.

1888. Horwitz, Orville, M.D., Clinical Professor of Genito-urinary Diseases in Jefferson Medical College; Surgeon to the Philadelphia Hospital.

1868. Howell, Samuel B., M.D., Professor of Chemistry in the Medico-Chirurgical College.

1892. Hughes, William E., M.D., Professor of Clinical Medicine in the Medico-Chirurgical College; Visiting Physician to the Philadelphia and Medico-Chirurgical Hospitals; Pathologist to the Presbyterian Hospital.

1871. Ingham, James V., M.D.

1885. Jackson, Edward, M.D., Professor of Diseases of the Eye in the Philadelphia Polyclinic; Surgeon to Wills Eye Hospital.

1887. Jayne, Horace, M.D., Professor of Vertebrate Morphology in the Biological Department of the University of Pennsylvania.

1885. Judd, Leonardo Da Vinci, M.D.

1867. Judson, Oliver A., M.D.

1886. Jurist, Louis, M.D., Chief Clinical Assistant in the Laryngological Department of Jefferson Medical College Hospital.

†1867. Keen, William W., M.D., LL.D., Professor of the Principles of Surgery and of Clinical Surgery in Jefferson Medical College; Surgeon to Jefferson Medical College Hospital and to the Orthopædic Hospital and Infirmary for Nervous Diseases, and Consulting Surgeon to St. Agnes's Hospital and to the Woman's Hospital; Membre Correspondant Étranger de la Société de Chirurgie de Paris; Membre Honoraire de la Société Belge de Chirurgie.

*1887. Kelly, Howard A., M.D., Professor of Gynecology in the Johns Hopkins University, and Gynecologist and Obstetrician to the Hospital, Baltimore, Md.

*1844. King, Charles R., M.D., Andalusia, Pa.

†1875. Kirkbride, Joseph J., M.D.

1892. Lainé, Damaso T., M.D.

*1865. La Roche, C. Percy, M.D., Rome, Italy.

1887. Leaman, Henry, M.D.

1893. LeConte, Robert G., M.D., Surgeon to the Methodist Episcopal Hospital and to the Out-patient Departments of the Pennsylvania Hospital and Children's Hospital; Assistant Surgeon to the Orthopædic Hospital and Infirmary for Nervous Diseases, and to the Gynecean Hospital.

1883. Leffmann, Henry, M.D., Professor of Chemistry in the Philadelphia Polyclinic and in the Woman's Medical College; Pathological Chemist to Jefferson Medical College Hospital.

1892. Leidy, Joseph, M.D., Physician to the Out-patient Department of the Pennsylvania Hospital; Assistant Surgeon in the Genito-urinary Department of the University of Pennsylvania.

1855. Lewis, Francis W., M.D.

1877 Lewis, Morris J., M.D., Physician to the Children's Hospital, to the Orthopædic Hospital and Infirmary for Nervous Diseases, and to the Pennsylvania Hospital.

1886. Lloyd, J. Hendrie, M.D., Physician to the Nervous and Insane Department of the Philadelphia Hospital, to the Methodist Episcopal Hospital, and to the Home for Crippled Children.

1893. Longaker, Daniel, M.D.

1877. Longstreth, Morris, M.D., Professor of Pathological Anatomy in Jefferson Medical College; Physician to the Pennsylvania Hospital.

1886. MacCoy, Alexander W., M.D., Professor of Diseases of the Throat and Nose in the Philadelphia Polyclinic; Lecturer on Diseases on the Throat and Nose in the Woman's Medical College of Pennsylvania.

1896. Makuen, G. Hudson, M.D., Laryngologist to St. Mary's Hospital; Lecturer on Defects of Speech in the Philadelphia Polyclinic.

*1885. Mallet, John W., M.D., Charlottesville, Va.

1893. Marshall, John, M.D., Assistant Professor of Chemistry in the University of Pennsylvania.

1889. Martin, Edward, M.D., Surgeon to the Howard Hospital; Clinical Professor of Genito-urinary Diseases in the University of Pennsylvania.

1887. Massey, Isaac, M.D., Surgeon to the Pennsylvania Railroad; Physician to the Chester County Hospital.

1885. Mays, Thomas J., M.D., Professor of Diseases of the Chest and of Experimental Therapeutics in the Philadelphia Polyclinic; Visiting Physician to Rush Hospital.

1875. McClellan, George, M.D., Surgeon to the Howard Hospital.

1895. McFarland, Joseph, M.D., Professor of Pathology and Bacteriology in the Medico-Chirurgical College; Pathologist to Rush Hospital.

1868. Mears, J. Ewing, Professor of Anatomy and Clinical Surgery in the Pennsylvania College of Dental Surgery; Gynecologist to Jefferson Medical College Hospital; Surgeon to St. Agnes's Hospital.

1875. Meigs, Arthur V., M.D., Physician to the Pennsylvania

Hospital; Consulting Physician to the Pennsylvania Institution for the Instruction of the Blind.

*1884. Mifflin, Houston, M.D., Columbia, Pa.

1894. Miller, D. J. Milton, M.D., Physician to the Episcopal Hospital; Assistant Physician to the Children's Hospital.

1881. Mills, Charles K., M.D., Professor of Mental Diseases and of Medical Jurisprudence in the University of Pennsylvania; Professor of Diseases of the Mind and Nervous System in the Philadelphia Polyclinic; Clinical Professor of Nervous Diseases in the Woman's Medical College; Neurologist to the Philadelphia Hospital.

†1888. Mitchell, John K., M.D., Instructor in Clinical Medicine in the University of Pennsylvania; Physician to St. Agnes's Hospital; Assistant Physician to the University Hospital and to the Infirmary for Nervous Diseases,

1856. Mitchell, S. Weir, M.D., Professor of Diseases of the Mind and Nervous System in the Philadelphia Polyclinic; Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases; Consulting Physician to the Maternity Hospital.

1882. Montgomery, Edward E., M.D., Clinical Professor of Gynecology in the Jefferson Medical College; Obstetrician to the Philadelphia Hospital.

1863. Morehouse, George R., M.D., Ph.D.

1886. Morris, Caspar, M.D., Physician to the Episcopal Hospital and to the Out-patient Department of the Pennsylvania Hospital.

1893. Morris, Elliston J., M.D., Physician to the Dispensary of the Episcopal Hospital.

1883. Morris, Henry, M.D., Gynecologist to the Howard Hospital.

1856. Morris, J. Cheston, M.D.

1861. Morton, Thomas G., M.D., Surgeon to the Pennsylvania and the Orthopædic Hospitals; Consulting Surgeon to the Jewish Hospital; Emeritus Surgeon to Wills Eye Hospital.

1891. Morton, T. S. K., M.D., Professor of Surgery in the Philadelphia Polyclinic; Surgeon to the Polyclinic Hospital; Assistant Surgeon to the Orthopædic Hospital; Surgeon to Out-patient Department of the Pennsylvania Hospital; Consulting Surgeon to the Philadelphia Dispensary.

1864. Moss, William, M.D.

1890. Müller, Auguste F., M.D., Attending Physician to the Germantown Hospital.

1882. Musser, John H., M.D., Assistant Professor of Clinical Medicine in the University of Pennsylvania; Physician to the Philadelphia Hospital and to the Presbyterian Hospital; Consulting Physician to the Woman's Hospital of Philadelphia and to the West Philadelphia Hospital for Women.

1896. Myers, T. D., M.D.

1886. Neff, Joseph F., M.D.

1887. Neilson, Thomas Rundle, M.D., Surgeon to the Episcopal Hospital and to St. Christopher's Hospital for Children; Professor of Genito-urinary Surgery in the Philadelphia Polyclinic; Assistant Demonstrator of Surgery in the University of Pennsylvania.

1889. Noble, Charles P., M.D., Surgeon-in-Chief to the Kensington Hospital for Women; Surgeon-in-Charge of the Department for Women of the Northern Dispensary; Surgeon-in-Charge of the Department for Women of the Union Dispensary; Lecturer on Gynecology in the Philadelphia Polyclinic.

1893 Noble, William H., M.D.

1869. Norris, Herbert, M.D., Supervising Physician to St. Clement's Hospital.

1865. Norris, Isaac, Jr., M.D.

1892 Norris, Richard C., M.D., Lecturer on Clinical and Operative Obstetrics, University of Pennsylvania; Obstetrician-in-Charge, Preston Retreat; Visiting Obstetrician to the Philadelphia Hospital; Gynecologist to the Methodist Hospital; Consulting Obstetrician and Attending Gynecologist to the Southeastern Dispensary and Hospital.

1866. Norris, William F., M.D., Professor of Ophthalmology and Clinical Professor of Diseases of the Eye in the University of Pennsylvania; Surgeon to Wills Eye Hospital.

1884. Oliver, Charles A., M.D., Attending Surgeon to Wills Eye Hospital; Ophthalmic Surgeon to the Philadelphia and the Presbyterian Hospitals; Consulting Ophthalmic Surgeon to St. Agnes's, St. Mary's, St. Timothy's, and Maternity Hos-

pitals; Consulting Ophthalmologist to the State Hospital for the Chronic Insane of Pennsylvania.

1884. O'Neill, J. W., M.D.

*1885. Osler, William, M.D., Professor of Medicine in Johns Hopkins University, and Physician to the Hospital, Baltimore, Md.

1890. Packard, Frederick A., M.D., Visiting Physician to the Philadelphia and Children's Hospitals; Physician to the Out-patient Department of the Pennsylvania Hospital; Instructor in Physical Diagnosis in the University of Pennsylvania.

1858. Packard, John H., M.D., Late Surgeon to the Pennsylvania Hospital; Surgeon to St. Joseph's Hospital.

1864. Pancoast, William H., M.D., Professor of Anatomy and of Clinical Surgery in the Medico-Chirurgical College; Consulting Surgeon to the Philadelphia Hospital for Skin Diseases.

1882. Parish, William H., M.D., Professor of Obstetrics in the Dartmouth Medical College; Professor of Anatomy in the Woman's Medical College of Pennsylvania; Consulting Obstetrician to the Lying-in Charity; Consulting Surgeon to the Kensington Hospital; Consulting Gynecologist to St. Agnes's Hospital.

1883. Parvin, Theophilus, M.D., Professor of Obstetrics and Diseases of Women and Children in the Jefferson Medical College.

1896. Pearce, F. Savary, M.D., Instructor in Physical Diagnosis in the University of Pennsylvania; Physician to Out-patient Department, St. Agnes's Hospital.

†1889. Penrose, Charles Bingham, M.D., Professor of Gynecology in the University of Pennsylvania; Surgeon to the Gynecean Hospital.

1854. Penrose, R. A. F., M.D., LL.D., Professor (Emeritus) of Obstetrics and Diseases of Women and Children in the University of Pennsylvania; Consulting Obstetrician to the Maternity Hospital; Visiting Physician to the Preston Retreat.

1868. Pepper, William, M.D., LL.D., Professor of the Theory and Practice of Medicine in the University of Pennsylvania.

1884. Perkins, Francis M., M.D., Ophthalmic Surgeon to St. Agnes's Hospital; Ophthalmic Surgeon to the Presbyterian Hospital.
1890. Phillips, J. Willoughby, M.D.
1883. Piersol, George A., M.D., Professor of Anatomy in the University of Pennsylvania.
1872. Porter, William G., M.D., Surgeon to the Presbyterian Hospital and to the Philadelphia Hospital.
1896. Posey, W. Campbell, M.D., Assistant Surgeon Wills Eye Hospital; Ophthalmologist to the Howard Hospital, and to the State Hospital for the Insane at Norristown; Ophthalmologist to the Home of the Merciful Saviour for Crippled Children.
1885. Potter, Thomas C., M.D.
1887. Price, Jacob, M.D.
†1889. Price, Joseph, M.D., Obstetric Physician to the Philadelphia Dispensary.

1889. Randall, B. Alexander, M.D., Clinical Professor of Diseases of the Ear in the University of Pennsylvania and Professor of Diseases of the Ear in the Philadelphia Polyclinic; Ophthalmic and Aural Surgeon to the Children's Hospital; Otologist to Rush Hospital.
1887. Reed, Charles H., M.D.
1885. Reichert, Edward T., M.D., Professor of Physiology in the University of Pennsylvania.
1891. Rhoads, Edward G., M.D.
1895. Ring, Gassaway Oram, M.D., Ophthalmic Surgeon to the Episcopal Hospital, and Ophthalmic and Aural Surgeon to the Samaritan Hospital, Philadelphia.
1891. Risley, S. D., M.D., Lecturer on Ophthalmology in the University of Pennsylvania; Attending Surgeon at the Wills Eye Hospital; Professor of Ophthalmology in the Philadelphia Polyclinic and College for Graduates in Medicine.
†1878. Roberts, John B., M.D., Professor of Anatomy and Surgery in the Philadelphia Polyclinic; Professor of Surgery in the Woman's Medical College of Pennsylvania; Surgeon to the Methodist Hospital.
1888. Robins, Robert P., M.D., Visiting Physician to the Dispen-

sary of the House of Industry, to the Church Home for Children, and to the Board of Guardians of the Poor; Lecturer on Chemistry in the Episcopal Academy.

†1866. Schaffer, Charles, M.D., Professor of Botany in the Pennsylvania Horticultural Society.

1887. De Schweinitz, George E., M.D., Clinical Professor of Ophthalmology in the Jefferson Medical College; Professor of Ophthalmology in the Philadelphia Polyclinic; Ophthalmic and Aural Surgeon to the Children's Hospital; Ophthalmologist to the Orthopædic Hospital and to the Philadelphia Hospital; Consulting Ophthalmic Surgeon to the Methodist Episcopal Hospital.

1895. Scott, J. Alison, M.D., Demonstrator of Physical Diagnosis in the University of Pennsylvania; Physician to Out-patient Department, Pennsylvania Hospital; Physician to the Church Home; Assistant Medical Director of Penn Mutual Life Insurance Company.

1892. Seiss, Ralph W., M.D., Professor of Otology in the Philadelphia Polyclinic.

1888. Seltzer, Charles M., M.D.

1875. Seyfert, Theodore H., M.D.

1884. Shaffner, Charles, M.D., Ophthalmic Surgeon to the Presbyterian Hospital.

1887. Shakespeare, Edward O., M.D.

1876. Shippen, Edward, A.M., M.D., U. S. Navy (retired).

1891. Shober, John B., M.D., Surgeon to the Gynecean Hospital Dispensary.

1890. Shoemaker, George Erety, A.M., M.D., Gynecologist to the Methodist Hospital.

†1893. Shoemaker, Harvey, M.D., Visiting Physician to the Sheltering Arms, Southern Home for Destitute Children, and Pennsylvania Epileptic Hospital; Physician to Out-patient Department of the German, Episcopal, and Children's Hospitals.

1896. Shoemaker, William T., M.D., Surgeon to the Eye Dispensary of the German Hospital.

1880. Simes, J. H. C., M.D., Emeritus Professor of Genito-urinary and Venereal Diseases in the Philadelphia Polyclinic

1873. Simpson, James, M.D.

1872. Sinkler, Wharton, M.D., Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases; Neurologist to the Philadelphia Hospital; Physician to the Epileptic Hospital of Philadelphia.

1895. Slocum, Harris A., M.D., Gynecologist to St. Clement's Hospital for Epileptics; Professor of Gynecology in the Philadelphia Polyclinic.

*1863. Smith, A. K., M.D., U. S. A. (retired), New Hartford, Conn.

*1864. Smith, Edward A., M.D., New York.

1896. Smith, Lawrence S., M.D., Instructor in Clinical Gynecology in the University of Pennsylvania; Chief Surgeon to the Dispensary for Diseases of Women in the Hospital of the University of Pennsylvania; Assistant Surgeon to the Gynecean Hospital; Visiting Obstetrician to the Maternity Hospital; Surgeon 1st Regiment Infantry, N. G. P.

1895. Spellissey, Joseph M., M.D., Visiting Surgeon to St. Mary's Hospital; Out-patient Surgeon to the Pennsylvania, Methodist, and St. Agnes's Hospitals, and Assistant Surgeon to the Orthopædic Dispensary of the University Hospital.

1894. Stahl, B. Franklin, Ph.G., B.S., M.D., Instructor in Physical Diagnosis in the University of Pennsylvania; Visiting Physician to St. Agnes's Hospital; Ophthalmic Surgeon to Charity Hospital.

1875. Starr, Louis, M.D.

1892. Steinbach, Lewis W., M.D., Professor of Clinical and Operative Surgery in the Philadelphia Polyclinic; Visiting Surgeon to the Philadelphia Hospital and to the Jewish Hospital of Philadelphia.

1884. Stelwagon, Henry W., M.D., Ph.D., Clinical Professor of Dermatology in Jefferson Medical College; Dermatologist to the Philadelphia Hospital; Physician to the Department for Skin Diseases of the Howard Hospital and the Northern Dispensary; Clinical Professor of Dermatology in the Woman's Medical College.

1895. Stengel, Alfred, M.D., Instructor in Clinical Medicine, University of Pennsylvania; Assistant Physician, University Hospital; Professor of Clinical Medicine, Woman's Medical College; Physician to Howard, Philadelphia, and Children's Hospitals; Pathologist to German Hospital.

1888. Stewart, David D., M.D., Professor of Diseases of the Stom-

ach and Intestines in the Philadelphia Polyclinic; Attending Physician to the Episcopal Hospital.

†1842. Stillé, Alfred, M.D., LL.D., Professor (Emeritus) of the Theory and Practice of Medicine in the University of Pennsylvania; Consulting Physician to the Maternity Hospital, to the Woman's Hospital, and to Rush Hospital.

*1846. Stocker, Anthony E., M.D.

1884. Stryker, Samuel S., M.D., Physician to the Presbyterian Hospital.

1866. Taylor, John Madison, M.D., Neurologist to Howard Hospital; Assistant Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases; Assistant Physician to the Children's Hospital; Professor of Children's Diseases in the Philadelphia Polyclinic; Fellow of the American Academy of Medicine.

1887. Taylor, William J., M.D., Surgeon to St. Agnes's Hospital, and Assistant Surgeon to the Orthopædic Hospital and Infirmary for Nervous Diseases.

1886. Taylor, William L., M.D., Instructor in Clinical Gynecology in the University of Pennsylvania, and Chief of the Clinic and Assistant Gynecologist to the Hospital of the same; Surgeon-in-Chief to the Beacon Service for Women.

1867. Thomas, Charles Hermon, M.D.

†1869. Thomson, William, M.D., Professor (Honorary) of Ophthalmology in the Jefferson Medical College, and Ophthalmic Surgeon to the Hospital of the same; Emeritus Surgeon to Wills Eye Hospital.

1896. Thorington, James, M.D., Adjunct Professor of Diseases of the Eye in the Philadelphia Polyclinic; Assistant Ophthalmologist, Wills Eye Hospital; Ophthalmologist to the Methodist Orphanage; Ophthalmologist to the Vineland Training School for Feeble-minded Children.

1896. Toulmin, Henry, M.D., Instructor in Physical Diagnosis in the University of Pennsylvania; Obstetrical Registrar, Philadelphia Hospital; Attending Physician to the Philadelphia Home for Incurables; Attending Physician to the Church Home, Angora.

1894. Tunis, Joseph Price, M.D., Assistant Demonstrator of Anatomy and of Surgery in the University of Pennsylvania; Sur-

geon to the Methodist Hospital; Surgeon to the Dispensaries of the Presbyterian and Children's Hospitals.

1866. Tyson, James, M.D., Professor of Clinical Medicine in the University of Pennsylvania; Physician to the University Hospital; Visiting Physician to the Philadelphia Hospital.

1864. Vandyke, E. B., M.D.

1873. Van Harlingen, Arthur, M.D., Emeritus Professor of Diseases of the Skin in the Philadelphia Polyclinic; Dermatologist to the Howard Hospital.

1893. Vansant, Eugene Larue, M.D., Lecturer on Clinical Medicine in Jefferson Medical College; Visiting Physician to the Philadelphia Hospital.

1883. Vinton, Charles Harrod, M.D.

1885. Walker, James B., M.D., Attending Physician to the Philadelphia Hospital; Lecturer on Clinical Medicine and Consulting Physician to the Woman's Hospital

1893. Warren, Joseph W., M.D., Associate Professor of Physiology in Bryn Mawr College.

1895. Watson, Arthur W., M.D.

1886. Watson, E. W., M.D., Physician to the Pennsylvania Institution for the Blind; Visiting Physician to the Home for Consumptives.

1875. Webb, William H., M.D.

1883. Welch, William M., M.D., Physician-in-Charge of the Municipal Hospital for Contagious Diseases; Consulting Physician to the Northern Dispensary; Consulting Physician to the Northern Home for Friendless Children.

1893. Westcott, Thompson S., M.D., Visiting Physician to the Methodist Episcopal Hospital; Physician to Out-patient Department, Children's Hospital.

1884. Wharton, Henry R., M.D., Demonstrator of Surgery in the University of Pennsylvania, and Assistant Surgeon to the Hospital of the University of Pennsylvania; Surgeon to the Children's, Presbyterian, and Methodist Episcopal Hospitals.

1883. Whelen, Alfred, M.D.

1878. White, J. William, M.D., Professor of Clinical Surgery in

the University of Pennsylvania; Surgeon to the Maternity Hospital.

†1880. Willard, De Forest, M.D., Clinical Professor of Orthopædic Surgery in the University of Pennsylvania; Surgeon to the Presbyterian Hospital; Consulting Surgeon to the White and to the Colored Cripples' Homes and to the Home for Incurables.

*1878. Williamson, Jesse, M.D., Visiting Surgeon, St. Francis Hospital, Colorado Springs, Colorado; Surgeon of Colorado-Philadelphia Reduction Co.; Consulting Surgeon to Denver, Texas, and Gulf R. R.

1881. Wilson, H. Augustus, M.D., Professor of General and Orthopædic Surgery in the Philadelphia Polyclinic; Clinical Professor of Orthopædic Surgery in the Jefferson Medical College; Consulting Orthopædic Surgeon to the Philadelphia Lying-in Charity and to the Kensington Hospital for Women.

1874. Wilson, James C., M.D., Professor of the Practice of Medicine and of Clinical Medicine in Jefferson Medical College, and Physician to the Hospital of the same (Faculty Staff); Physician to the German Hospital; Attending Physician, Pennsylvania Hospital; President of the Philadelphia County Medical Society.

†1884. Wirgman, Charles, M.D., Physician to the Hospital of Jefferson Medical College and to the Howard Hospital; Physician to Out-patient Department of Children's Hospital.

1893. Wolff, Lawrence, M.D., Demonstrator of Chemistry in the Jefferson Medical College; Visiting Physician to the German Hospital; Clinical Professor of Medicine in the Woman's Medical College.

1893. Wood, Alfred C., M.D., Instructor in Clinical Surgery in the University of Pennsylvania; Assistant Surgeon to the University Hospital; Surgeon to the Philadelphia Hospital.

1865. Wood, Horatio C., M.D., Professor of Materia Medica, Pharmacy, and General Therapeutics in the University of Pennsylvania, and Clinical Professor of Diseases of the Nervous System in the Hospital of the same.

1880. Woodbury, Frank, M.D., Honorary Professor of Clinical Medicine in the Medico-Chirurgical College, and Physician to the Hospital of the same.

1866. Woods, D. F., M.D., Physician to the Presbyterian Hospital.

1888. Woodward, Charles E., M.D., Physician to the Chester County Prison and West Chester Board of Health; U. S. Examining Surgeon.

1878. Wormley, Theodore G., M.D., LL.D., Professor of Chemistry in the University of Pennsylvania.

1860. Wurts, Charles Stewart, M.D., Physician to Foster Home.

1868. Yarrow, Thomas J., M.D.

1889. Young, James K., M.D., Instructor in Orthopædic Surgery, University of Pennsylvania, and Chief Attending Surgeon in the Orthopædic Department of the Hospital; Professor of Orthopædic Surgery, Philadelphia Polyclinic; Clinical Professor of Orthopædic Surgery in the Woman's Medical College of Pennsylvania; Surgeon to the Home for Crippled Children.

1894. Zentmayer, William, M.D., Assistant Surgeon to Wills Eye Hospital; Ophthalmologist to St. Mary's Hospital, Philadelphia, and to the Stratford Castle Hospital, Phœnixville, Pa.

1887. Ziegler, Walter M. L., M.D., Assistant Aural Surgeon and Chief of the Dispensary for Diseases of the Ear in the Hospital of the University of Pennsylvania.

1895. Zimmerman, Mason W., M.D., Ophthalmic Surgeon to the Germantown Hospital.

ASSOCIATE FELLOWS.

[Limited to Fifty, of whom Twenty may be Foreigners.]

ELECTED

1873. Acland, Henry W., M.D., F.R.S., Oxford, England.
1890. Baccelli, Guido, Rome, Italy.
1877. Barnes, Robert, M.D., London, England.
1876. Billings, John S., M.D., U. S. A., Washington, D. C.
1886. Bowditch, Henry P., M.D., Boston, Massachusetts.
1894. Brunton, T. Lauder, M.D., London, England.
1877. Chaillé, Stanford E., M.D., New Orleans, Louisiana.
1886. Cheever, David W., M.D., Boston, Massachusetts.
1896. Conner, Phineas Sanborn, M.D., Cincinnati, Ohio.
1893. Councilman, William T., M.D., Boston, Massachusetts.
1876. Davis, N. S., M.D., Chicago, Illinois.
1886. Draper, William H., M.D., New York.
1892. Emmet, Thomas Addis, M.D., New York.
1883. Fayrer, Sir Joseph, M.D., LL.D., F.R.S., London, England.
1892. Fitz, Reginald H., M.D., Boston, Massachusetts.
1896. Fletcher, Robert, M.D., Washington, D. C.
1876. Green, Traill, M.D., Easton, Pennsylvania.
1883. Heath, Christopher, F.R.C.S., London, England.
1896. Jaccoud, Prof. S., M.D., Paris, France.
1874. Jackson, J. Hughlings, M.D., London, England.
1891. Jacobi, A., M.D., New York.
1893. v. Jaksch, Rudolf, M.D., Prague, Bohemia.
1876. Johnson, Sir George, M.D., F.R.S., London, England.
1893. Kerr, John G., M.D., Canton, China.
1896. Leyden, Dr. Ernst, Berlin, Germany.
1877. Lister, Sir Joseph, Bart., M.D., LL.D., F.R.S., London, England.

ELECTED

1896. Lusk, William T., M.D., New York.
1895. McBurney, Charles, M.D., New York.
1886. McGuire, Hunter, M.D., Richmond, Virginia.
1876. Moore, E. M., M.D., Rochester, New York.
1873. Ogle, John W., M.D., London, England.
1874. Paget, Sir James, Bart., M.D., LL.D., F.R.S., D.C.L., London, England.
1876. Pollock, A. M., M.D., Pittsburg, Pennsylvania.
1886. Reeve, John C., M.D., Dayton, Ohio.
1886. Senn, Nicholas, M.D., Milwaukee, Wisconsin.
1896. Pye-Smith, P. H., M.D., London, England.
1896. Sternberg, George M., M.D., U. S. A., Washington, D. C.
1896. Stewart, Sir T. Grainger, Bart., M.D., Edinburgh, Scotland.
1886. Thomas, T. Gaillard, M.D., New York.
1896. Tiffany, L. McLane, M.D., Baltimore, Maryland.
1869. Valcourt, Th. de, M.D., Cannes, France.
1892. Virchow, Rudolf, M.D., Berlin, Germany.
1894. Warren, J. Collins, M.D., Boston, Massachusetts.
1894. Weir, Robert F., M.D., New York.
1892. Welch, William H., M.D., Baltimore, Maryland.
1886. Whittaker, James T., M.D., Cincinnati, Ohio.
1886. Yandell, David W., M.D., Louisville, Kentucky.

CORRESPONDING MEMBERS.

ELECTED

1880. Carrow, Flemming, M.D., United States.
1880. Chiara, Domenico, M.D., Florence, Italy.
1886. Dey, Kanny Lall, M.D., Calcutta, India.
1885. Rendu, Jean, M.D., Lyons, France.

NECROLOGICAL LIST

FELLOWS

H. ERNEST GOODMAN	Feb. 3, 1896
OWEN JONES WISTER	Feb. 24, 1896
WINTHROP SARGENT	March 19, 1896
WILLIAM HUNT	April 17, 1896
A. SYDNEY ROBERTS	August 17, 1896

ASSOCIATE FELLOWS

C. G. COMEGYS	Feb. 10, 1896
JOSEPH JONES	Feb. 17, 1896
HIRAM CORSON	March 3, 1896
SIR GEORGE MURRAY HUMPHRY, Bart.,	July 24, 1896
F. PEYRE PORCHER	Nov. 19, 1895

CORRESPONDING MEMBER

JOHN STRAHAN	Jan. 23, 1896

CONTENTS.

PAGE

List of Officers and Standing Committees iii
List of Presidents of the College v
List of Fellows of the College vii
List of Associate Fellows of the College xxix
List of Corresponding Members xxx
Necrological List for 1896 xxxi
Memoir of W. S. W. Ruschenberger, M.D. xxxv
Memoir of Owen Jones Wister, M.D. xliii
Annual Address of the President lvix

On the Functions of the Neuron, with Especial Reference to the Phenomena Presented by Hysteria and Hypnotism. By F. X. Dercum, M.D. 1
A Case of Surgical Injury to the Ureter. By J. M. Baldy, M.D. . 14
Congenital Erosion and Split of the Cervix Uteri. By C. B. Penrose, M.D., Ph.D. 18
Supravaginal Hysterectomy for Impossible Labor, with Intrapelvic Treatment of the Stump. By B. F. Baer, M.D. 27
Supravaginal Hysterectomy for Impossible Labor, with Intrapelvic Treatment of the Stump. By Edward P. Davis, A.M., M.D. 36
Intracranial Tumors. The Eye-symptoms of Intracranial Tumors. By William F. Norris, M.D. 47
The Surgical Treatment of Intracranial Tumors. By William W. Keen, M.D. 56
The Diagnosis of Intracranial Tumors. By Charles K. Mills, M.D. 67
Remarks on Certain Ocular Phenomena in Their Relation to Intracranial Growths. By George E. de Schweinitz, M.D. . 73
Brain-tumors, Otitic Brain-abscesses, and Aural Vertigo. By Charles H. Burnett, M.D. 79
Some of the Surgical Uses to which Carbolic Acid of Official Strength has been Applied. By Oscar H. Allis, M.D. . . . 90
The Clinical Application of the Röntgen Rays:
I. The Apparatus and Its Use. By William Francis Magie, Ph.D. 97
II. In Surgical Diagnosis. By William W. Keen, M.D., LL.D. 104
III. The Study of the Infant's Body and of the Pregnant Womb by the Röntgen Rays. By Edward P. Davis, A.M., M.D. . 111

PAGE

The Presentation of an Unusual Temperature-Chart. By Charles B. Penrose, M.D. 118

Suppression of Urine of Long Standing without Symptoms of Uræmia. By Wharton Sinkler, M.D. 121

On the Hypodermic Use of Iron. By J. M. Da Costa, M.D., LL.D. 132

A Case of Tumor of the Cerebellum in which Operation was Rejected. By James Hendrie Lloyd, A.M., M.D. . . . 141

A Case of Perforate Septum Ventriculorum, with Remarks on the Diagnosis. By J. P. Crozer Griffith, M.D. . . . 152

Report of a Case of Imperfect Closure of the Auricular and Ventricular Septa in a Man Dead at the Age of Fifty Years from Abscess of the Brain. By Frederick A. Packard, M.D. . 159

Case of Carcinoma of Descending Colon; Excision and Anastomosis; Recovery. By John H. Musser, M.D., and Thomas S. K. Morton, M.D. 170

A Case of Thoracic Aneurism. By John B. Shober, M.D. . . 174

A Study of the Accidental Restoration of the Dislocated Shoulder and Hip—with Inferences Upon the Mechanism of Displacement. By Oscar H. Allis, M.D. 188

Exhibition of Specimens 195

Case of Bullet Imbedded in the Tissues of the Neck, Located by Skiagraphy. By Robert G. Le Conte, M.D. 197

Note on Infantile Scurvy. By Joseph Leidy, Jr., M.D. . . 199

A Case of Secondary Carcinoma of the Bones; Multiple Fractures; Associated Duodenal Ulcer; Polyuria. By John H. Musser, M.D. 206

A Graphic Study of Tremor. By Augustus A. Eshner, M.D. . 215

Case of Foreign Body in the Larynx; Death from Suffocation. By Guy Hinsdale, M.D. 228

A Case of Movable Liver. By Frederick A. Packard, M.D. . 230

Cholecystotomy: A Floating Liver and Distended Gall-bladder Mistaken for a Floating Kidney. By William W. Keen, M.D. 242

A Case of Transposition of the Viscera, Associated with Small Round and Spindle-celled Sarcoma of the Liver and Probable Sarcomatous Infiltration of Other Organs. By H. M. Fisher, M.D. 245

Appendix—Additions to the Mutter Museum 249

Abstract of the Report of the Library Committee . . . 250

List of Papers: Section on Ophthalmology 251

List of Papers: Section on Otology and Laryngology . . 253

List of Papers: Section on Gynecology 255

List of Papers: Section on General Surgery 257

W. S. W. RUSCHENBERGER, M.D.

By JOHN ASHHURST, Jr., M.D.

[Read November 4, 1896.]

William Samuel Waithman Ruschenberger, a Fellow of this College for fifty-seven years and its eighth President in order of succession, was born near Bridgeton, New Jersey, on September 4, 1807, and was, therefore, in his eighty-eighth year at the time of his death, which took place on March 24, 1895. For nearly sixty-nine years was he a valued member of the Medical Corps of the U. S. Navy, having entered the service as surgeon's mate when a lad of less than nineteen, on August 10, 1826. After more than forty-three years of active duty he was placed on the retired list on September 4, 1869; eighteen months subsequently he was commissioned as Medical Director with the relative rank of Commodore, upon the establishment of that grade in March, 1871; and this rank he continued to hold during the remainder of his life. In the earlier portion of his naval career Dr. Ruschenberger made several long voyages, records of which he gave in books designated as *Three Years in the Pacific*, two volumes, 1834; and *A Voyage Around the World*, 1838, both of which works were found of such interest as to be published in England as well as in this country. Twenty years after he again made another long cruise as Fleet Surgeon of the Pacific Squadron, and upon this occasion published his *Notes and Commentaries During Voyages to Brazil and China*. His most noteworthy accomplishment during his periods of shore duty was the organization of the United States

Naval Laboratory, which, by securing a supply of pure drugs and serviceable stores of all kinds, proved of inestimable value to the medical corps and thus indirectly to the whole country.

The work effected by Dr. Ruschenberger in immediate connection with his position as a medical officer of the navy would have seemed to most men sufficient to justify the spending of the hours not thus occupied in rest or recreation only; but to our late Fellow relief from official duty but served to furnish time for general scientific research and observation, and his labors in this direction were quite as productive as in the other. He received the degree of Doctor of Medicine from the University of Pennsylvania in 1830, graduating as a classmate of Arnold (of Georgia), Carson, Gerhard, Norris, and Stewardson, and a near contemporary of Bridges, Hiram and William Corson, Fahnestock, Fox, Goddard, Kirkbride, Pancoast, Pepper, and Minturn Post. Always interested in the proceedings of scientific bodies, Dr. Ruschenberger appears to have become a junior member of the old Philadelphia Medical Society while yet a student, at the age of eighteen (November, 1825); a Correspondent of the Academy of Natural Sciences while on one of his cruises, in May, 1832; a Fellow of this College in April, 1838; and a Member of the American Philosophical Society in October, 1849. All of these bodies were well served by our late President, who was ever faithful in his attendance at their meetings when in the city, and was always mindful of their interests even when distance rendered it impossible for him to take part in their deliberations. Of the Academy and of this College he was successively Vice-President and President, holding the highest office in the former institution for twelve years and in the latter for four. Of the Philosophical Society he was one of the Vice-Presidents for more than ten years, from 1885 until the time of his death.

Dr. Ruschenberger was a voluminous writer; his books of travel have already been referred to, but an even more popular publication, in some respects, was his *First Books of Natural History*, a series of eight small volumes taken mainly from the text of Milne Edwards and Achille Compte, and devoted to

Anatomy and Physiology, Mammalogy, Ornithology, Herpetology and Ichthyology, Conchology, Entomology, Botany, and Geology. It is not too much to say that no American publication has ever done more, if as much, to throw open the great fields of natural science to the people of the United States as did this set of unpretentious manuals, which fifty years ago were most extensively employed in the schools and academies of our country, and were treasured books of reference in many farm-houses throughout our land. Among his writings of more strictly medical interest may be mentioned several well-narrated cases—particularly one of intestinal obstruction, which, before the revival of abdominal section for this condition, proved fatal in the person of a gallant officer of our navy, whose loss is still deplored in the circles of Philadelphia society—and especially an elaborate report "On the Origin and Properties of Cundurango," published in 1873. But, perhaps, the work by which Dr. Ruschenberger's name will be most surely handed down to posterity is his "Account of the Institution of the College of Physicians of Philadelphia," presented at the meeting of the College on October 6, 1886, and published in the "Centennial Volume" of its *Transactions* in the following year. This excellent work is doubtless so familiar to those who hear me that it would be superfluous to speak of it at length; suffice it to say that as a concise history of this College during the first hundred years of its existence, and therefore in large degree a history also of the medical profession in our city during the same period, it will always be highly valued, both for its accuracy and for its fairness, by all who shall be interested in the matters with which it deals.

Dr. Ruschenberger was happy in his domestic relations; on October 23, 1839, he married Miss Mary B. Wister, a daughter of Charles J. Wister, Senior, of Germantown, and an elder sister of two of our late Fellows—Dr. Caspar Wister, long a member of our Committee on Finance, and Dr. Owen J. Wister, whose recent death is still fresh in our memories. For more than half a century was Dr. Ruschenberger blessed by his wife's companionship; one great grief, the loss of a beloved daughter,

they bore together with tender sympathy and with Christian resignation, and his faithful partner survived by several years the golden anniversary of their wedding-day, which they commemorated in 1889. One son, Lieut. C. W. Ruschenberger, has outlived his parents.

Very few now remain who knew Dr. Ruschenberger in his early days, and I think myself fortunate, therefore, in being permitted to quote the following record prepared by another of our former Presidents, Dr. Alfred Stillé, and communicated by him to the College at the time of Dr. Ruschenberger's death:—

"In the autumn of 1838," says Dr. Stillé, "fifty-seven [now fifty-eight] years ago, I sailed from Havre to New York on the packet ship Ville de Lyon, commanded by Captain Stoddard. Four of the eight or ten passengers were physicians, and one of them was Dr. Ruschenberger. Our voyage occupied thirty-eight days, yet it was not tedious, for our companions were congenial. It was then that my acquaintance with our late friend began, and it never since has failed Even. then, at thirty-one years of age, he displayed the qualities which were conspicuous in him during his whole life: breadth and accuracy of knowledge, precision of language and deliberation of speech, and his characteristic preference for things over opinions, fancies, or theories. For the latter he had no taste or mental aptitude. His nearest approach to imagination was shown by his relish for humor suggested by the incongruities of things. But the bent of his mind was toward classification, and it led him away from purely medical to scientific subjects.

"In spite of his life-long connection with the Medical Corps of the Navy, and his manifold and fruitful efforts to improve its service, his preference was always for natural science rather than for clinical investigation, and it was in the former field that he labored most diligently and gained the greatest distinction. Whatever subject he treated, its influence for the time dominated him. Even in those admirable biographies which from time to time he produced, he was less careful to portray

the person than to present an analysis of characteristic traits of thought and action. So minute and yet so clear was his portraiture that anyone who had known the original was struck by its truth to nature; while those who had not enjoyed that advantage recognized a portrait without exaggeration and without flattery.

"Few men in any field of culture toiled more faithfully. Labor was his delight, and he never abandoned it for idle and luxurious days, but as long as he lived pursued it unremittingly. General society had little fascination for him, and yet he enjoyed intercourse with his chosen friends, and attached them to himself by his simplicity and sincerity. Fortunately for him and for them his mind suffered no decay as his physical strength declined. Nor was there any failing of that sturdy uprightness, that manly independence, that supreme reverence for truth and honor which belonged to his nature and which were strengthened by long discipline in the public service. Few men have excelled him in the usefulness of their lives, or left behind the record of a more upright character; few have reached so venerable an age with less errors to regret, or with more substantial claims to honor as a man of science, a physician, and a citizen; very few have preserved to so venerable an age so clear a mind, so kindly a disposition, and so lively an interest in the movements of the scientific and the medical worlds."

My own friendship with Dr. Ruschenberger was of comparatively modern date. While I had known him in the Academy of Natural Sciences and in this College as a Junior Fellow may know a Senior, I had no claim to intimacy with him until in the winter of 1872, when he called upon me and invited me to join in the deliberations of a committee appointed by the American Medical Association to revise the *Nomenclature of Diseases*, which had recently been published by the Royal College of Physicians of London. The active members of this committee were Dr. Francis Gurney Smith, its Chairman; Dr. George B. Wood, at whose house we met; Dr. Alfred Stillé,

Dr. Ruschenberger, Dr. William Goodell, and myself. The other members were our colleague, Dr. Theophilus Parvin, then of Indiana; Dr. R. F. Michel, of Alabama; Dr. William M. McPheeters, of Missouri; Dr. Lunsford P. Yandell, of Kentucky; Dr. A. B. Palmer, of Michigan; Dr. J. J. Woodward and Dr. George A. Otis, of the U. S. Army; and Dr. Austin Flint, Senior, of New York. Of the whole committee, fourteen in number, only five, I think—Dr. Stillé, Dr. Parvin, Dr. Michel, Dr. McPheeters, and myself—still survive. We met in the evening, in Dr. Wood's parlor, weekly, and sometimes oftener, through the winter and ensuing spring, and performed the task which had been intrusted to us with such ability as we possessed. Our report, which was duly presented by Dr. Smith, our Chairman, was treated with but scant courtesy by the Association; and it is to be hoped that the labor expended upon it by the members who took part in its preparation may have proved to each of them its own reward.

From this time onward I was frequently associated with Dr. Ruschenberger in various relations, both official and professional, and always found him the same: careful and exact in his methods, deliberate in his manner, of untiring industry and unfailing punctuality, uniformly just, and at the same time uniformly courteous, even to those who were not always courteous to himself. I never saw him lose his temper, and never knew him fail to maintain his presence of mind. In short, the "sweet reasonableness" of his disposition was such that those who came to know him well could not but feel for him both esteem and affection.

As a writer, Dr. Ruschenberger was clear and concise; saying just what he meant in as few words as were necessary, his style was correct without any attempt at grandiloquence. As a practitioner he was careful, conscientious, and safe. It was occasionally my privilege to be associated with him in consultation, and I attended with him continuously our former Librarian, Dr. Robert Bridges, in his last illness. To his patients and to their families Dr. Ruschenberger was more than a physician: he was a trusted, sympathetic friend; and the

number of his kind deeds shown toward those who invoked his aid in the extremities of sickness and death will never be known on this side of the grave.

The last occasion on which I had the pleasure of seeing Dr. Ruschenberger was on February 8, 1895, when I called upon him to say that a number of the Fellows of this College asked the privilege of having painted an oil portrait of him, to be added to the collection in our Hall. Though feeble in body, he received me with all his old-time cordiality and affection, and at once acceded to my request, only stipulating that, as his medical adviser had forbidden him to go out during the bad weather then prevailing, he should be given sittings at his home. This the artist, Mr. Lambert, happily was able to do, and the portrait, begun promptly, advanced rapidly to completion, so that in five weeks it was essentially finished—none too soon, for in ten days more its subject had passed beyond the bar, to that land where portraits will not be needed, for there shall we see face to face; we shall know even as also we are known.

MEMOIR OF OWEN JONES WISTER, M.D.

By S. WEIR MITCHELL, M.D.

[Read December 2, 1896.]

It is seldom that our Censors have asked the President to appoint a Fellow to read a memoir under the circumstances which attend the present instance. Their action needs some explanation.

Usually the biographies which cover our history for more than a century are reserved for such as have held places of distinction, for the great teachers of our art, or for those who have contributed to the literature of medicine.

Dr. Owen Jones Wister had none of these claims to be remembered. He was a suburban and country physician. He held no place as a teacher. He taught us nothing through the journals. He wrote no books or papers; and yet, what he was is instructive, and what he indirectly taught us is worthy of record and full of interest.

In other lands it would be difficult to find among physicians in country practice a personality like his, nor is it a common thing in our own land. I hope to make it clear to you why it was worth while to tell the simple story of the life of a thorough gentleman, who, with none of the larger demands on our attention, was, during a somewhat long life, an important and useful member of our profession.

The finest flower of what is most precious in our guild is not always to be found among those to whom fall even the best merited of the great prizes—the most coveted honors.

Owen Jones Wister was born October 5, 1825, at a house in

Germantown which bears on its gable a date, 1744, and J. W., the initials of its founder, after the fashion of his German fatherland. He was one of two brothers, John and Caspar Wister, who immigrated to this country in the first quarter of the last century from Wild Hillspach, a hamlet near Heidelberg, where their people had lived for generations, holding from father to son the office of huntsman to the Prince Palatine. Their house, a high-ridged, low-eaved, cross-timbered cottage, rather bigger and better than its neighbors, is still to be seen at Hillspach, and is known as the Jägerhaus, or huntsman's house. They were folk of some local consequence; but whence they came to the Palatinate, or what became of the rest of them after the emigration of Caspar and John, neither record nor tradition says; the line breaks off in the fatherland shortly afterward, to be continued in America. The brothers, who did not come out in the same year, brought with them some curious bits of old silver bearing their initials and a German Bible, apparently of the sixteenth century, with queer woodcuts. On the blank reverse of the leaf illustrating the going forth of Isaac from his father's home and the death of Abraham, one has written in German: "My father died in peace, January 13, 1726," which was after his emigration.

John and Caspar Wister settled in Philadelphia, and the latter established at Salem, New Jersey, what are said to have been the first glass works in America—flasks and wineglasses of his manufacture are still extant. The brothers were superior in education and condition, and perhaps in means, to the average German emigrant of that period, but they undoubtedly held by some fibres to this stock, which shows its sturdy and tenacious quality in the children's grandchildren. They married and multiplied. In the next generation one son was educated by the learned Tunkers, at Ephrata, Pa., with whom he afterward corresponded in Latin, which he also spoke. Another was the friend of Zinzendorf, the leader of the Moravian colony on the Lehigh, and of their Bishop, Von Schweinitz; others married with Quaker families of high standing in the Welsh settlement and joined that religious connection. Two of them signed the

Non-importation Resolutions of the Philadelphia merchants in 1765, and several of them were promoters of the beneficent and educational enterprises of that town. A century after the first of the family came to this country his descendants had made their mark on the communities to which they belonged, and had produced a man of distinction, Professor Caspar Wister.

The love of science and letters was a recurring characteristic among the already numerous branches of the family, and Charles Jones Wister, the father of Owen, was a conspicuous instance of these tastes.

Owen Jones Wister was the third son, and fifth child, of his father's second marriage, which, like the first, was to a lady of English descent.

Germantown, in 1825, was a village in the wider meaning of the term, with traditions, worthies, habits, and customs of its own, having its one street-lamp and a semi-weekly post from Philadelphia. There was a small circle of intelligent people who met each other frequently in neighborly intercourse and at that pleasant feast of bygone times—supper.

Owen Wister was never a Quaker in spirit or in letter, and in later life one of his diversions was to perplex his Quaker patients by questions as to the irreconcilable differences of doctrine to be found in William Penn's writings, which he read in pursuit of this pastime. Nevertheless, Quakerism was one of the influences that set the deepest stamp upon him. Another was the tuition of A. Bronson Alcott—Emerson's Alcott—who was brought to Germantown by the solicitous parents of the village. Mr. Alcott's singular theories of education are well known. He kept what would now be termed an infant school, and before the children knew their letters he read aloud to them the *Pilgrim's Progress*, Bulwer's *Monos and Daimonos*, the *Castle of Otranto*, and other allegorical and supernatural stories to develop their imaginations, while he developed their moral natures by such methods as punishing a culprit by chastising an innocent child.

As he grew older Owen Wister attended the Germantown Academy, and more than one school beside, which was thought

to offer peculiar advantages. He always stood high in his class, and was cited as a model scholar, particularly in mathematics; yet he never ceased to feel the want of systematic instruction and of a university education.

This period lasted until he was seventeen, when his father's means became crippled, and he first felt the necessity of doing something for himself. He met with no encouragement from his father, whose chief wish in life was to keep his children about him at any sacrifice.

The eldest son of the second marriage, who long after became our well-known Fellow, Caspar Wister, left home and went to Texas to fight the Mexicans with General Houston. Owen thought that the navy offered him the best chance, but this his father did not approve.

Then, always opposed by his father, he went into business in Philadelphia with Messrs. Thomas Morgan & Co., oil merchants. This experiment lasted but a few months, during which Owen Wister lived in town and was very unhappy. It ended by his being sent to collect a bill of a lady whom he knew, on which he left his employers.

Other plans were proposed, Mr. Charles Wister stoutly resisting any which took his favorite child from him, as they all necessarily would do, until Owen Wister decided that he would study medicine.

He began to study medicine in 1845, as was the custom, in the office of the family friend and physician, Dr. Betton, and attended lectures at the University of Pennsylvania. At Dr. Betton's he met men who were already, or were to become, leaders of the profession; with others was the brilliant Paul Goddard, many years his senior, with whom he formed a lasting friendship.

Among other privileges of his student days, Owen Wister counted the kindness of Dr. Rhea Barton, who, although at the height of his fame, was very amiable and accessible to younger men. He occasionally rode to Dr. Barton's country-house near the Rising Sun village to talk anatomy and surgery, and to the end of his life remembered with pleasure the kind-

ness of his reception and the illuminating perspicuity of those informal lectures. His reminiscences of most of his professors were humorous and not particularly respectful. He graduated in 1847 and immediately applied for a position in the navy. He received his appointment as assistant surgeon and orders to join the twenty-gun sloop-of-war Plymouth, in February, 1848. The country-bred lad sailed for the East India station, a three-years' cruise—a long absence and a long distance in those days.

The senior surgeon died on shore while the Plymouth was in China, and Dr. Hopkinson, the second in rank, was taken ill, so that for a time Owen Wister was the only medical officer on duty, and he derisively styled himself fleet-surgeon. He shared the strange, semi-princely life of the East India merchants, and met Anglo-Saxon, Christian gentlemen of education and breeding in command of opium smugglers under the eyes of British and American civil and military authorities, who were there to enforce the treaty suppressing the trade. He had the usual encounters with Chinese pirates, saw the outposts of rebel tribes encamped at the gates of Canton, and caught glimpses of the countries and races of the Antipodes. He got some habits of the world as well as of the navy and his profession, and a modicum of experience and adventure. The episode was of use to him in many ways. He sailed for home in the Dolphin, under command of Captain Page, with some of the old mess; they were nearly lost off Cape Horn in a tremendous storm, when the rigging froze, but reached home at the end of June, 1851.

Sea-fare brought on a dyspeptic condition which proved so obstinate that during his first half-year on shore he lost strength and weight to a serious degree. This, added to other motives, disposed him to give up the navy; he resigned in June, 1852.

He had already begun to practise in Germantown, which was no longer the village of his boyhood, having grown into a big suburban town, straggling far into the country to the north, east, and west. The opening for a young physician was exceptionally good at this juncture, and, aided by favorable cir-

cumstances, Owen Wister's success was very rapid. In the course of a few years he had the largest and most desirable practice in the place, his rounds extending from Chestnut Hill and Jenkintown to the Rising Sun village, and from beyond Cheltenham to Manayunk, a circuit of, roughly speaking, thirty miles. During seasons of sickness his visits numbered forty a day. To support such a practice he gave up one by one the amusements of his age, and was less and less often to be met except in the sick-room or on the road to it.

Germantown went on growing at the rate of a Western town; good doctors came in quick succession to do the work, of which there was plenty for them; but Owen Wister kept the lead.

In 1859 he married Miss Sarah Butler, and for the next ten years his life was an instance of devotion to his profession, such as is not often seen and ought not to be imitated. He allowed himself no recreation; he belonged to no club; he took no holiday; he sometimes let a twelvemonth pass without going even to Philadelphia, ordering his books, instruments, clothing, and managing his affairs by letter. He scarcely ever accepted an invitation in the neighborhood, yet seldom passed an entire evening at home; his evenings, like his days, belonged to his patients. The entire sum of his absences from Germantown between November, 1859, and June, 1869, would not amount to a month. The Civil War brought out his ardent patriotism in several ways: he made no charge for attendance on officers or soldiers, and joined the Home Guard, sparing time for the drills which he would not give to rest or relaxation.

To those who witnessed Owen Wister's daily life during those ten years, the wonder was that human nature could withstand such a degree of overwork for so long a time. He was warned by his colleagues; solemnly warned by his friend, Dr. Rhoads, whose health had already given way under less strain; warned by acute dyspepsia, by the aggravation of his constitutional sick headaches, which at last became terrible attacks, sometimes lasting forty-eight hours; by agonizing

neuralgia and increasing insomnia. Only his abstemious habits and the fact that for so many hours of the day he was breathing the fresh air of the open country enabled him to hold out. The years 1865, 1867, 1868, and 1869 brought death to some of his nearest and dearest relatives; twice with shocking suddenness. He did not pause in his work, although his sleeplessness and overstrained condition became alarming, until one evening he found himself unable to write a prescription. He was then nearly forty-four, but even when most out of health was taken by strangers to be under thirty-five.

He passed the summer of 1869 in vain search of repose and sleep, and, in May, 1870, he sailed for Europe with his wife and son, and remained there for three years. In London Owen Wister met Drs. Grailey Hewitt, Acland (now Sir Henry), Anstie, and Dr. Henri Gueneau de Mussy, and formed a friendly acquaintance with the last two, which was renewed in subsequent years. Even yet at this time of his best opportunity his nerves would not tolerate the least thought or talk on medical matters, which cut him off from much of the interest of intercourse with men of his own profession. His keenest enjoyment abroad arose from his truly American love for what is old. Old legends, old names, old customs, old families, old ruins, old relics, old saws and proverbs, especially if Scotch, were his delight during the first year, when he was debarred from many of a traveller's pleasures. The elasticity of his temperament, his mercurial disposition, and unquenchable animal spirits came to his aid, however, as well as the extraordinary youthfulness, mental and physical, which made him look and seem fifteen years below his age. His headaches, as we see so often, ceased by degrees as he became older, and during later life he was almost free from them and from neuralgia; he always continued to suffer more or less from dyspepsia, and although insomnia gave way before rest and change in the course of a twelvemonth, the tendency never left him altogether.

In 1873 Owen Wister came back to America, but not to Germantown, as he did not wish to be drawn into his former round.

In 1874 he settled at an old country place on the York Road, restricting his visits within certain limits and declining to practise obstetrics. Office-practice he had always discouraged by various original devices, and now by way of getting rid of it entirely he made it known that he would see only charity patients at his own house. He was surprised that this arrangement did not answer his end; his new office became a sort of free dispensary for the impecunious of the country far and near, and these he often visited for weeks during any serious illness. He resumed his place on the Board of Managers of the Germantown Hospital, on which he had served since its foundation, and became a member of the consulting staff of the Jewish Hospital, continuing to perform the duties of these positions assiduously for the rest of his life.

The political opinions of a man who lived through the fateful sixties of this century cannot be other than important as regards character. Owen Wister had grown up among Whigs, to whom the name Democrat, or, as they said, Locofoco, was an abomination. When the Whig party disappeared he passed on naturally into the Free Soil and Republican ranks.

In 1876 the corruption of the Republican party determined him to vote the Democratic ticket; but thenceforth he voted for the men he believed in as the best representatives of sound money, free-trade, civil-service reform, and other issues in which for twenty years past right has taken a stand against wrong irrespective of party lines. He never took any public part, even in local politics, but his incessant and vehement arguments and adjurations among a set of too conservative men with whom he was in familiar relations can hardly have failed to do something for good government.

As personal shyness was a first and final obstacle to his speaking in public, so a singular manual difficulty prevented his writing for publication. Though he had the deft and nimble fingers of a mechanician, he had not the easy pen of the scribe. He was forced to move his hand at each word,

almost at each letter, or his writing became illegible. As his ideas and expressions came fast his pen was always so much in arrears that he hurried over his sentences to keep up with himself. This stood in the way of his forming a style, and made writing a penance to him; his native impatience was extreme and added to the irritation caused by this discrepancy of pace; of dictation and typewriters he would have none. Yet to his few correspondents he gave generous measure, not only in frequency and length of his letters, but in their substance. His letters have every quality of his conversation.

Impatience plucked him out of the way he would go in many directions; what came hardest to him was to wait.

In learning, although facility of acquisition and a most retentive memory added to the power and habit of concentrated attention and made the process rapid, it was never easy. He chafed under it to a degree which forbade his studying for pleasure alone. As an offset to this shortcoming he had tenacity of purpose which was shown from early childhood. When a little fellow he longed for a box of soldiers, enough to make a company; none was given to him; but he had a frugal allowance of pocket money, a cent a week, and every Saturday he carried it to a small shop near home, where, among other simple imported toys, there were very well set-up little leaden soldiers at a cent a piece. He persevered in this for two years, when he had his full company, with which he manœuvred to his heart's content until the time for play-things was past. When he was forty-five he determined to learn French, of which he knew virtually nothing; he was in Rome, and the only teacher to be found was an Italian, who used nothing but French and Italian text-books. Owen Wister did not understand a word of the latter language; nevertheless he began in spite of these drawbacks, and in ten or a dozen lessons learned French sufficiently well to read upon any subject in it with entire ease, and for the rest of his life read as much French as English.

Between 1874 and 1884 Owen Wister went occasionally to New England, where he had many friends and where his son

was being educated, and to the South on business; he also went once more to Europe, but only for six weeks, on account of his wife's health.

Young people loved him and he loved them; they seemed to be his most natural companions. Children amused him, but he did not like them, and the smaller they were, the less to his fancy; yet he had great attraction for them as well as for animals, of which he was exceedingly fond. He had a peculiar mode of conversation for children and animals, and exercised a sort of spell over them, though what they made of his droll talk it were hard to divine.

For fifteen years after his return to his profession he was a busy doctor; after this his practice gradually declined, owing in part to his steady refusal to extend it beyond the circumference he drew for it in 1873, from which many of his patients moved further afield. As he said in 1891, it was drying up, leaving him work enough for a long morning and not for a whole day, except where severe cases of illness obliged him to make a second round. But he was by no means idle or inactive during this latest period. Germantown doctors had grown wiser and took holidays, during which Owen Wister was ready to look after their patients for them. He took an amount of exercise unusual for men in his profession, and which, no doubt, had much to do with prolonging his phenomenal youthfulness of appearance and address, and new if not grave responsibilities came into his life at a fortunate moment. He was elected successively to the directorship of the Philadelphia Contributionship, familiarly known as the old Hand-in-Hand Insurance Company, to that of the Library Company of Philadelphia, and to the Philadelphia Saving Fund Society. The membership of these boards involved duties which Owen Wister performed with zeal when they did not interfere with what he owed his patients. They had zest for him in differing from any which had hitherto fallen to his share.

He disliked what is generally understood as society. While in Europe from 1870 to 1873 he had some opportunity of

seeing it very agreeably. Mr. Motley was then our Minister in London, Mr. Bancroft in Berlin, Mr. Jay in Vienna, and Mr. Marsh in Rome, all old acquaintances, who received this genial companion with the friendliest hospitality. In London and Rome he had access to very pleasant circles, including some celebrated people, but he never entered into any of this heartily. When he had satisfied a passing curiosity about foreign manners, his instinct and inclination brought him back to his fireside wherever it happened to be, and it was nearly as difficult to get him to stir from it then as a quarter of a century later. The board dinners of the various Philadelphia societies to which he belonged he enjoyed thoroughly. The variety of profession and experience among the members gave their social meetings a flavor which he did not find either at dinners in general society or those where the guests were mostly of one calling, even literary men or artists who offer such variety of type. At his boards he met men with different points of view and fresh funds of information who excited his love of talking, which, however, seldom required stimulus. Owen Wister was a great talker, but not an incessant one, as he had moods and days of taciturnity. He talked not for the pleasure of hearing himself or of having others hear him, but simply because he enjoyed it, as a child enjoys running and jumping, and the spontaneousness and oddity of his utterances had something akin to that mode of progression. He was eager to talk over the books he read, and he was a constant reader, in his busiest times seldom going to bed without allowing himself two hours even if he began at midnight. As his leisure increased he read more and more, memoirs, biographies, travels, political economy and sociology, fairy stories and tales of adventure, history, and military works. He had an intuitive perception and comprehension of military situations and movements and a predilection for the subjects themselves, such as physicians have often exhibited.

Thus his years went on in the paths of his youth, and they seemed to pass over him without leaving a trace. On one occasion, when nearly sixty, he walked for half-a-day in the

mountains of Virginia, carrying a gun. The same afternoon he rode on horseback fourteen miles, and was the freshest of the whist party in the evening.

His habits remained those of a young man to the last: the cold bath, long walk, and drive in the open wagon all winter. His resistance to weather, to storm, or the extremes of heat or cold was extraordinary.

The first touch of age came with the loss of his brother Caspar, who was like him to identity in many characteristics and peculiarities, and an entire contrast to him in others; they had a more perfect understanding with each other than with anyone else. Owen Wister never ceased to miss his brother. Life lacked something to him thenceforth, and to those who knew him best something of his old self was lacking. He reached the age of seventy, and few men ever looked it less. He was not made to bear old age or infirmity, and had they overtaken him he could not have said, as he did during his brief, last illness, that his life had been a very happy one; they would have broken his heart. He died February 24, 1896, after a brief illness, having been a Fellow since 1852.

It is by no means unusual for a physician of ability and amiability to be an idol to his patients. But it is proof of the charm of a strong personality, when the death of a man unknown to fame, who has been little from home during his last quarter-century, and who was never much in society, calls forth from all parts of this country and Europe, from people who were never under his care, some of whom had not seen him for twenty years, from others young enough to be his children and grandchildren, outbursts of attachment, admiration, sympathy, and personal sorrow. Such letters came by hundreds, with invariable reference to his youthfulness and spirits, his vitality and vivacity, his stimulating influence. Not one referred to his having fulfilled the appointed years of human life, or spoke of his having reached his natural term; on the contrary, the universal expression was of surprise at his having been snatched away; the most frequently recurring phrases were: "I could never connect the idea of death with him"; "he seemed to

belong to life and youth". A stranger reading them would have supposed that his end had been premature.

The bald facts of Owen Wister's life convey no true sense of the man. He was of that not rare type—an American, a republican with the belief that the monarchy of suffrage had better be limited.

In his ways and manners there was a certain directness which may have been a Quaker inheritance, but with it there were distinct personal flavors in all he said and did. In his professional life was felt the gentleman of undoubted social place; of instinctive well-mannered kindliness. I have seen few who were at need more self-contained, but that *self* contained a world of tenderness, and was most apt to overflow for the sick, the hurt of heart, the poor, and friendless. Many knew Owen Wister long and saw not this side of the man. Only after his death did his own people learn how deeply he had impressed, how generally won, the hearts of the hard-working class within reach of his sympathies.

An immense vitality was one of his values. It seemed to attract animals and fascinate children; but he talked to them as no one else did—a flow of gay, humorous chat with the abandonment of a merry youngster. Cats he had and many. A great white cat came daily when he was dressing, and then he talked as if to a child. One day she was vainly making her toilette with her tongue, after being among the coal. He was overheard to say: "You could not lick yourself clean, not if you had the tongue of men and angels." This endless humorous talk went on daily, the cat evidently entertained and purring approval.

During grave illness among his patients this boundless fund of vitality was of service. It lifted and sustained. It was then friendly, thoughtful, reassuring. When the time of convalescence arrived, and usually with those he liked, the same richness of energetic health overflowed in chat which was characterized by an originality of phrase and thought full of quaint surprises, and sparkling with unexpected flashes of humor so individually peculiar as to defy description. Now

and then you were struck by his power of condensed and picturesque statements. When some one spoke of England as like a cone inverted with a world of active life resting on that little point of island, he said: "Yes, she is like a top, she must keep on spinning or fall."

Of the difficulty of lessening the number of ignorant users of the ballot, he said: "Alas! but what man can be got to vote that he shall not vote?"

A patient complained of his inability to resist temptations. Wister laughed and said: "I yield to mine always; you know it is written that if you resist temptations they will fly from you. Now I have so few I cannot afford to have them fly away."

I could run on endlessly. The charm of this talk was the absence of effort—its easy, lightsome flow.

He seemed to me, at his best, a model of a well-read, thoughtful physician with all the aids of good breeding, acute sense of duty, absolute self-devotion, and rarely rivalled power as a talker who also knew to listen.

He was very slow to accept novelties, but in the end he was commonly found in the possession of all new resources; but perhaps a little later than they came valuably to some of us. There are those here who may have lived long enough to confess to the occasional wisdom of such hesitation.

I never think of him without recalling his views on so-called vivisection. He wished earnestly to restrict it, but became at last convinced that the methods advised and the character of its opponents did not permit him to continue to wage in their company a hopeless battle. I cannot forget with what courage he faced, as one of a minute minority, the overwhelming opinions of this College. He was painfully shy as to speech in public. Life-long friends were on the other side. He spoke on this occasion of his own views with vigor, strong feeling, and the reserve and breeding of a gentleman. Perhaps on no subject did he feel more earnestly, but it never affected in the least degree his relations to men, like myself, who held to opposite opinions as resolutely as he.

The type of the country physician is one quite apart from him of the city; it has its grades and varieties. At the top we must place a man like the subject of this memoir.

Owen Wister was my friend; I knew him well, but neither my thought nor affectionate memories have enabled me to paint for you this genial comrade—this most devoted physician.

ANNUAL ADDRESS OF THE PRESIDENT.

By J. M. DaCOSTA, M.D., LL.D.

[Read December 2, 1896.]

At our December meeting the affairs of the College particularly claim our attention, and your President is expected to pass in review the chief events of interest and importance of the past year, and to make such suggestions for increased usefulness and success as observation of the working of the College in its different departments makes manifest.

The College has done a large amount of scientific work. The bulk of this has been accomplished in the different sections. These have been carried on with spirit, and not only have papers been read and cases shown, but interesting discussions have taken place in several instances following valuable papers read by Associate Fellows, or by invited guests from other cities. Among them may be mentioned the essays of Professor McLane Tiffany, of Baltimore; of Dr. Pilcher, of Brooklyn; and of Dr. George Henry Fox, of New York, in the Surgical Section; that of Professor William T. Lusk, of New York, in the Gynæcological Section. In the Ophthalmic Section thirty papers and reports were read in a year; and thirteen cases, nine new instruments, and a number of pathological specimens shown. In the Section on General Surgery twenty-nine separate contributions were presented, and, for the most part, discussed, and a number of patients illustrating rare and instructive conditions exhibited. In the Gynæcological Section, in eight meetings, twenty-five papers were

read, leading to active discussions. In the Section of Otology and Laryngology fourteen papers were submitted and eight patients brought before the meeting.

At the regular stated meetings, where there has been also much of great interest presented, twenty-six papers and two memoirs were read. The clear demonstration of the value of the Roentgen rays in surgery and obstetrics, by Dr. W. W. Keen, Dr. E. P. Davis, and Prof. W. F. Magie, brought together a large number of the Fellows and of invited guests. An elaborate discussion on "Cerebral Tumors" took place at a special meeting in February, and Fellows pursuing various lines of work and active in the different Sections joined in comparing and uniting their experiences in a subject of common interest. Discussions such as these cannot fail to extend the foundations of precise knowledge, and it is proposed to continue them in the coming year by devoting one or more meetings to special topics. A debate on "The Relation of Nervous Disorders in Women to Pelvic Diseases" is now being arranged for the February meeting of the College.

It is a great pity that with so much activity as has been manifested, and so much material as has been brought together, the College cannot collect all its work in one annual volume, even if some of the contributions have been elsewhere published. Until this is done—for the mere enumeration by title in our TRANSACTIONS of the papers read at the Sections is quite insufficient—the College loses much reputation to which it is fairly entitled. I have had interviews with the Chairman of the Publication Committee, and perfectly practicable plans have shaped themselves for adoption, if our funds permitted them. But careful estimates prove that a volume of the kind contemplated would require about double the amount of appropriation the Committee now receives. I trust we shall before very long see our way clear to spend such a sum. An adequate publication fund is, in my judgment, the greatest of the wants of the College, and would lead to far-reaching and most beneficial results. One of the Sections alone, the Gynæcological, published its *Transactions* for 1895 in an illustrated

volume of one hundred and sixty closely printed pages; and a similar volume will be issued for 1896.

The average attendance at the regular stated meetings has been $51\frac{7}{9}$. The largest number of Fellows recorded was at the meetings in March and in May, 79 at each. At the Gynæcological Section in January, when Prof. Lusk's paper was under discussion, there were 62 Fellows present, besides a considerable number of invited guests.

The College during the year revised and extended the rules governing the Sections, after careful consideration by a committee embracing the Chairmen of the Sections, the Secretary, and the President of the College. The rules, where amended, were altered in the light of experience gained, and their working is proving in every respect most satisfactory, alike to the Sections and to the College as a whole.

The Library contains now nearly 52,000 volumes, exclusive of duplicates, and 31,000 unbound pamphlets, reports, and transactions; therefore, about 2000 volumes more than last year, mostly the gift of Fellows. Upward of 600 current journals, transactions, and reports are received regularly. It is actively used, for over 5000 visitors to the Library during the year are recorded. It greatly needs additional book-stacks to accommodate its growth, especially the journals. It is hampered by the uncertainty of its income, and, with a view to obtain a permanent endowment, a special committee has been appointed. Co-operation with and generous support of this committee are strongly urged on the Fellows.

During the past year the Museum has received over two hundred accessions, Dr. John B. Roberts and Dr. Noble being specially generous donors. It is with much pleasure that I can speak of the collection of instruments which was fairly started only last year, and to which numerous and valuable additions have been made that will render this section of the Museum in time very valuable to the student of medical and surgical history. The instruments which had belonged to Dr. Goodell, Dr. Hunt, and Dr. Wister, and which have been given by members of their families, will always possess for the Fellows

a more than mere scientific interest. The Committee on the Museum has done most excellent work in increasing the accommodations for the growing collections, and in making them more and more available for physicians and students. Indeed, the Museum has been this year used more largely than ever. The delivery of the Mütter lectures in the Mütter Museum, as is being done now, for the first time, marks an era in its history. Other lectures too, that will make its rich material more productive of good, are in contemplation.

The committees continue to work with zeal. From their reports you will learn of their labors and their wants. To a few of their recommendations I may here call attention. The Hall Committee, which, by renting out our halls for lectures and other purposes most judiciously, has earned a considerable surplus, asks that this be set aside toward creating a fund for replacing the nearly worn-out furnaces by either steam or hot-water heating. I strongly recommend that the request be granted to the full. The changes inaugurated by the Committee on the Directory for Nurses have proved most satisfactory. Only nurses who have diplomas from training-schools are now registered, and the plan of charging each nurse a small registration fee has worked so well that the income for the year has been larger than anticipated, though it would be still larger, greatly to the advantage of all, if the Directory were more freely resorted to by the Fellows. Whatever helps the Directory actively, helps the College actively. The Committee on Entertainments has just issued invitations to a dinner to be given by the Weir Mitchell fund, and has in contemplation a reception for next year. It has been wisely allowing the interest to accumulate with a view of adding annually to the capital, so that an equal income at least may be assured when the existing high-interest bonds expire.

The membership of the College consists at present of 303 Fellows, 47 Associates, and 4 Corresponding Members. It will be found that the Associate Fellowships, limited to fifty, have been, in accordance with a recommendation in the last annual address, approved by the College, nearly filled by the election

of nine Associates, and, looking at the list, it is pleasant to see on it so many of the names of the most distinguished members of the profession. Fifteen Fellows have been added to the College. There has been one resignation, one forfeiture of Fellowship, and five have died. Thus, there are only eight more resident Fellows on our roll than last year.

The Fellowship of 303 could be, I believe, advantageously increased in the next year or two to about 350. I quite understand, and fully share, the feeling of the College in wishing to keep up a high standard of membership ; there is not a Fellow of this College who is not in sympathy with this feeling. But there are still many men in this large community who have all the requirements that the most rigid can demand, who would be pleased to be on our roll, and would make very acceptable Fellows. Let us bring them forward, and, abating nothing from our standard, join them to us. It is for the individual Fellows of the College to suggest them. A larger membership would mean greater prosperity, as well as more diffused usefulness. The demands on the College and its wants are yearly growing. As endowments come but slowly, there are but two ways of meeting these demands: to raise the yearly contributions, or to augment the number of Fellows. To increase the yearly contribution would be, I believe, not advisable; to increase the number of Fellows, with due regard to the standard and the traditions of the College, is, I think, both advisable and practicable.

The Fellowship of this College is, in truth, smaller now in proportion to the size of the city and the numbers in the profession than it was in the early days of the College. A hundred years ago, nine years after its foundation, there were thirty-one Fellows, according to the published list. Stephens's Directory of Philadelphia for the year 1796 gives the city a population of 55,000, and there were 74 physicians in the Directory, without including two doctresses and, strange to relate of times not so very remote and of this country, two surgeon-barbers. The proportion of physicians to the community, not including the doctresses and the surgeon-barbers, was 1 to 743

inhabitants, and about three physicians out of seven were Fellows of the College. In our present year there are 303 Fellows of the College, the population is estimated at about 1,200,000, and there are in round numbers 2000 physicians. This makes a proportion of about 1 physician to 600 inhabitants, and one only out of seven is a Fellow of the College. Thus, a hundred years ago, three times as many as now of the physicians of the city were Fellows of the College. It would then be, after all, only holding fast to the old order of things to have a larger Fellowship.

Our list has been sadly thinned this year by death. We miss from it the names of five Fellows: H. Ernest Goodman, Owen J. Wister, Winthrop Sargent, William Hunt, A. Sydney Roberts; of four Associate Fellows: C. G. Comegys, Joseph Jones, Hiram Corson, Sir George Murray Humphry; and of one Corresponding Member: John Strahan.

Goodman will be long remembered as one of the most popular men in the profession. He was fully as popular out of it; his handsome person, his affability, his genial manners attracted every one. He served with great distinction during our Civil War, first as Regimental Surgeon and afterward as Medical Director on the staff of several generals, especially in the Army of the Cumberland and the Army of the Potomac. He was with Sherman's army in its march to the sea, and was present in many a hard-fought action, always earning praise for the way in which his duties were performed. In 1865 he was brevetted Colonel "for faithful and meritorious services". He remained always warmly attached to the service, was prominent at all army gatherings, and loved nothing better than to have a war talk with old comrades. He was one of the founders of the Orthopædic Hospital, and held the positions of Professor of Clinical Surgery at the Medico-Chirurgical College, Surgeon to the Wills Hospital, to the Orthopædic Hospital, and Consulting Surgeon to the Maternity Hospital.

Wister was a personality; original, delightful. Humor and wit were united in him with such strong qualities that they formed but the brilliant setting to the manliness of his char-

acter and the vigor of a cultivated mind. Clearness of thought, admirable judgment, and decision were his characteristics in professional matters, as, indeed, they were in all else. He was often present at the meetings of this College, of which he was elected a Fellow in 1852, and took a deep interest in its actions and welfare.

Winthrop Sargent, born in Gloucester, Mass., in 1822, belonged to the distinguished Sargent family of that State. He was graduated in Arts at Dartmouth College in 1842; in Medicine at the University of Pennsylvania in 1847. He practised for a time in Montgomery County at Gwynedd, and was President of the Montgomery County Medical Society. Subsequently he moved to this city, his field of labor being chiefly in West Philadelphia. Of late years he lived at Roxbury, Mass. He had the artistic tastes of his family that have developed in such a striking way in his nephew, the celebrated painter, John Sargent, and was himself very fond of painting and of carving. He became a Fellow of the College in 1864.

William Hunt was for many years Chairman of the Committee on the Mütter Museum and a Censor of the College; for many years, too, he was Demonstrator of Anatomy at the University of Pennsylvania, a Trustee of the University, and Surgeon to the Pennsylvania Hospital. His sound sense and good judgment caused him to be looked up to in the profession; his good nature and good humor made him beloved, and in memory he will ever be with us, his associates in this College.

Sydney Roberts was elected a Fellow in 1882. In the later years of his life he was not seen at professional meetings, for he had withdrawn from the profession. Early in his career he devóted himself to orthopædic surgery, and proved himself a most ingenious surgeon. Several excellent papers, chiefly on orthopædics, gave promise of much good work.

C. G. Comegys, on our list as an Associate Fellow, was a highly respected physician and teacher of medicine in Cincinnati. He was well known to many here; he delivered the annual address before the Society of the Alumni of the Medical Department of the University of Pennsylvania in 1875.

Joseph Jones, an Associate Fellow since 1876, was an indefatigable worker. He was so as a student; he remained so all his life. He was chemist, pathologist, clinician, as well as teacher. As Professor in the Tulane University of Louisiana, he taught classes both in chemistry and in clinical medicine. He published many interesting investigations on Remittent Fever and on Yellow Fever. Most of these were contained in two large volumes of *Memoirs*, of which the first was issued in 1876, the second in 1887. The volumes comprise also a number of other papers, among which may be mentioned specially those on "Albinism in the Negro Race," the "Treatment of Yaws," "Leprosy in Louisiana," the "Pathological Anatomy of Cerebro-spinal Meningitis," "Experimental Illustrations of Convulsive Diseases," and on the "Relations of Pneumonia to Malaria."

Hiram Corson died at a very advanced age, practising medicine almost to the last. He was a practitioner of the old school, believing strongly in the remedies he had been taught to hold in esteem in his youth, bleeding, purging, and having little faith in what, in his eyes, were the effeminate therapeutics of our day. Very ethical, worshipped by his patients, who looked up to him with reverend awe, we can think of him as if he belonged to and typified the Fellows of our College of its early days, of whom he had many of the best qualities.

Sir George Murray Humphry was the well-known Professor, first of Anatomy, later of Surgery, at the University of Cambridge, and did much there for the cause of scientific medicine. He was also for years one of the editors of the *Journal of Anatomy and Physiology*. His treatises on the "Human Skeleton, including the Joints," and on the "Human Foot and the Human Hand," gave him a wide-spread reputation. In 1879 he delivered the Hunterian Oration. Among his best-known pathological and surgical essays are the ones on "The Coagulation of the Blood in the Venous System During Life," and "Old Age and Changes Incidental to It."

The reputation of John Strahan, of Belfast, is most familiar to us here by his being the author of an essay on "The Diag-

nosis and Treatment of Extra-uterine Pregnancy," to which the first Jenks Prize of this College was awarded. It was not, however, the only prize essay he wrote. He was, indeed, a man of wide acquirements and knowledge, and his death at the early age of forty-four was truly a loss to the profession everywhere.

One more death must be mentioned, that of our Associate Fellow, Dr. F. Peyre Porcher. It occurred last year, but we did not know of it when our *Transactions* for the year went to press. Dr. Porcher was a widely known and highly accomplished physician in Charleston, S. C., and Professor of Materia Medica and Therapeutics in the Medical College of the State of South Carolina. He always prized greatly, so his son writes us, his Fellowship among us.

I turn from the melancholy duty of enumerating the losses of valued friends and Fellows to congratulate you on the promising state of the College. The activity in its scientific work has never been more decided; its power for good never more marked; the assurance of extended usefulness never stronger. Its appreciation by the public is growing; and, better still, it continues to maintain the best professional tone, and, as powerfully as ever, to foster the spirit of a high grade of brotherhood.

ON THE FUNCTIONS OF THE NEURON, WITH ESPECIAL REFERENCE TO THE PHENOMENA PRESENTED BY HYSTERIA AND HYPNOTISM.

By F. X. DERCUM, M.D.,
CLINICAL PROFESSOR OF NERVOUS DISEASES, JEFFERSON MEDICAL COLLEGE; NEUROLOGIST TO THE PHILADELPHIA HOSPITAL.

[Read January 1, 1896.]

THERE has been noticeable of late years a tendency to misconstrue strangely the structure of the nervous system and to misinterpret the truths which that structure teaches. Curiously enough, this tendency has appeared with our increasing knowledge of the details of the intimate structure of the neurons and of the relations which they bear to each other. It is known, for instance, that the afferent fibres, those which convey impressions from without up to the cortex (themselves processes [axons] of peripheral neurons), terminate not in nerve-cells, but in the uppermost layer, the so-called molecular layer or molecular plexus of the cortex. Here in some way the minute divisions of the afferent fibres affect the fibres of this molecular plexus. The latter are in turn in direct communication with the nerve-cells of the cortex—are, in fact, themselves cell-processes. These facts suggested the idea that afferent impulses are diffused through the molecular plexus without involving or affecting the nerve-cells at all, and according to this interpretation the nerve-cells are left out of consideration entirely in studying nervous phenomena. This view has been especially advanced by Nansen, who maintains that the old manner of view relative to the composition of the reflex arc and the

physiological importance of the nerve-cells can no longer be sustained, inasmuch as the cells are not in direct communication with each other, and because direct communication between the central nerve-cells and the sensory or centripetal nerve-fibres is equally lacking. The reflex arc is constituted, according to Nansen,[1] first, by the centripetal nerve and its fibrillary ramifications passing directly into the nervous meshwork of the cortex—that is, into the molecular layer; secondly, by the propagation of the excitation through this molecular plexus; thirdly, by the transmission of stimuli to the minute lateral branches of the centrifugal or motor nerve-fibres. It follows that impulses are transmitted to the superior centres without passing directly through the nerve-cells. "We can admit in the same manner," continues Nansen, "that the voluntary impulses emanating from the nerve-fibres which emerge from the superior centres transmit themselves directly to the centrifugal fibres of the inferior centres without passing through the nerve-cells of these centres." He says, further, that it is impossible to admit that the nerve-cells of the inferior centres possess a direct importance in relation either to reflex movements or to voluntary movements, and that this seems to apply equally well to the nerve-cells of the superior centres. This view forces us to the conclusion that the activity of the nervous system, intelligence, consciousness, etc., is seated really in a fibrillary meshwork of the cortex—the molecular layer, and has nothing to do with the nerve-cells of the cortex. The latter, indeed, deprived of their psychic functions become simply "trophic" centres. They serve only for the maintaining of the nutrition of the nerve-fibres and their innumerable arborescent ramifications.

This view of Nansen's has been adopted by my esteemed colleague, Dr. Mills, who, in a discussion on cerebral localization at the last meeting of the American Neurological Association, and also in the *Text-book on Nervous Diseases by American Authors*, has maintained this position; he holds that "impulses are conveyed from processes to processes through the entire

[1] Soury: Les Fonctions du Cerveau, p. 316.

reflex arc, through the entire length of a cortico-efferent, or a cortico-afferent, projection-system" without passing through nerve-cells, and that "the function of the nerve-cell body is trophic;" that its "nuclei and nucleoli preside over the nutrition of the long or short fibres which pass out of or grow into them; and, further, that cells are of enormous bulk in order that they may be able to sustain these processes. In his words, "the aggregation of gray matter at various levels of the nervous system are watering- and feeding-places, not places for renewing nerve-activity."

Certainly this view does violence to the fundamental principle that the properties of a given tissue depend upon its cells, and that the cells are the integral parts of the tissues. Nowhere in the whole range of biology do we find a similar anomaly obtain as is implied by this view. It asserts that merely incidental structural attributes are of greater value than the individual cells, whose building up constitutes the tissue. Surely there is here an intrinsic contradiction.

Not only upon general principles is this view untenable, subversive of all that we have hitherto learned; but if carefully analyzed, it is found to present insuperable difficulties. If it be true that a nerve-fibre diffuses the energy which it conveys, in a general way scatters it through all the fibres or nerve-cell processes near which it happens to lie, it becomes impossible to explain the definite and precise actions of the nervous system, properties which are so characteristic of it. Nothing but hopeless confusion of function could result if such a thing were possible. It would mean that nerve-currents course indiscriminately, without relation to each other, through this network of fibres. It would mean that everything that had been done by nature to conserve and isolate nervous impulses, by enclosing the nerve-fibres in special sheaths of insulating material previous to their entrance into the cortex, had after all no purpose, because in the end the currents are turned wildly loose into a common receptacle.

The conservation of nerve-currents along cell-processes, no matter how long these may be, or whether they be in the cortex

or below it, is an absolute requisite. Were it not so, the various commissural and association tracts, whose existence we know of upon anatomical as well as upon physiological grounds, would assuredly be unnecessary, would have no meaning if the loose and unrestrained diffusion of nervous energy in the cortex, such as is implied by Nansen's view, were possible.

Further, such facts as we possess are directly opposed to a diffusion of nervous energy. According to Berkley,[1] by far the larger number of the finer fibres of the cortex are medullated almost to the extremities of the end-terminations. It is highly probable, Berkley maintains, "that in no instance except at the free termination is there actually such a thing as a naked axis-cylinder," and that "the conduction of the nerve-force from cell to termination and from termination to cellular protoplasm again is only through the medium of the ending of the nerve-fibre, and that there is no diffusion of the dynamic forces through the cortex, but that the action is a direct one." In this connection he further says: "To suppose for an instance that naked axis-cylinders are present in considerable numbers in the cortex is to me an impossibility, for we must necessarily suppose in such an event that in the closely packed arrangement of axons and dendrons presented by the outer portion of the pyramidal and in the molecular layer, where fibres and dendrites touch each other in all directions, the stimuli would quite as often be aberrant as direct and as frequently reach the wrong as the right destination. Naked axis-cylinders are in all likelihood a physiological impossibility in the cerebrum, for were they numerous we can suppose nothing but a constant overflow of stimuli from one cell to another, and consequent inco-ordination, not only of thought, but also of action."

Far from lending support to the view of Nansen, that the cell is to be left out of account in the consideration of nervous action, the discoveries of Golgi, Ramón Cajal, Van Gehuchten, and others have shown exactly the reverse. They have de-

[1] Medical News, November 9, 1895, p. 506.

monstrated beyond all question that, as in all other tissues, the cell is the actual integral structure. And while it was formerly held that the various cell-processes anastomosed freely with each other, we now know as a matter of fact that such anastomoses do not occur. The nerve-cell is a cell entirely by itself. It is a cell as distinct and as self-limited as any cell of any tissue with which we are acquainted. Far from being continuous through its processes with other cells, we learn that its processes nowhere fuse with other structures. Its processes are well limited, sharply defined, and bear no relation to those of other cells save that of propinquity or perhaps contact. The individuality of the nerve-cell as a morphological integer is wholly preserved.

If we grasp this idea in its full meaning, our conception of the nervous system changes profoundly. It is no longer a stringing together of telegraph wires and way-stations, but it consists of an aggregation of cell-integers, each one of which does its share in the production and in the transmission of nervous energy. For instance, the impulse proceeding from a motor neuron in the cortex is transmitted by the neuron through its own protoplasmic extension (the efferent nerve-fibre) to a definite aggregation of cells in the spinal cord. It communicates its energy to these cells in the spinal cord without in any way fusing with their protoplasm or their processes. In the same way the impressions that come by the various sensory paths come from peripheral neurons, those situated in the skin, in the retina, in the ear, in the taste-buds, or in the Schneiderian membrane, and are conveyed by fibres which are merely protoplasmic extensions of these peripheral neurons up to the cortex, where in turn they transmit their energy to the neurons of the cortex without fusing with them or their processes. Everywhere, and no matter in what light we view the nervous system, the signal importance of the nerve-cell as an individual entity is strikingly apparent.

A consideration of the above facts have suggested to me the following thought: Can it be that the neuron is not an absolutely fixed morphological element? Can it be that it pos-

sesses a certain, though perhaps limited, power of movement? Realizing the practical value and the wide application of such an explanation of the action of the nervous system I at once examined the literature to see whether a similar interpretation had occurred to others, and to gather such facts, if any, as could be brought forward in its support. I found that this thought had occurred independently to three observers, one in Germany and two in France. I found that in 1890 Rabl-Rückhard, in a short paper published in the *Neurologische Centralblatt*, had suggested the view that nerve-cells have an amœboid movement, and he also hinted briefly at the possible significance of such a fact, if true, upon our interpretation of the phenomena of hysteria. Rabl-Rückhard's ideas attracted little or no attention, and in August, 1894, without any knowledge of Rabl-Rückhard's theory, in a paper on "A Case of Hysteria of Peculiar Form," published in the *Revue de Médecine*, Lepine advanced the same view. In endeavoring to interpret the various shifting phenomena observed in his patient he advanced the idea that the neurons were capable of movement to such an extent as to enable them to vary the degree of their relation to each other. About half a year later Mathias Duval, without any knowledge of either of the views of Rabl-Rückhard or of Lepine, in a communication made to the Société de Biologie, advanced the same theory. A week later Lepine, before the same body, repeated his former arguments in support of the theory. Curiously enough this view, so suggestive, so pregnant with possibilities, did not meet with the support either of that veteran histologist, Kölliker, or that other high authority, Ramón Cajal. In a paper entitled "Some Conjectures on the Anatomical Mechanism of Ideation, Association, and Attention," published in the *Revista de Medicina y Cirurgia Practicas*, May 9, 1895, Ramón Cajal contended that the nerve-cells do not move, because (1) the terminal branches of the nerve-cells of the cerebellum, of the olfactory bulb, of the acoustic ganglia, optic lobes, etc., always present the same shape and the same degree of approximation to the cell-bodies irrespective of the

mode of death of the animal (chloroform, hemorrhage, curare, strychnine, etc.); (2) because the terminal nerve-branches of the retina and of the optic lobes in reptiles and batrachians presented always the same appearance, no matter whether the organs mentioned had remained in a condition of rest (the animals having been killed after remaining in darkness for a long time) or whether they had been functionally active (the animals being killed after prolonged exposure to sunlight.)

While Ramón Cajal thus opposes the theory of mobility of the neuron, he maintains, on the other hand, that the neuroglia-cells possess a great degree of mobility. He points out, for instance, that the neuroglia-cells of the cortex are at times stellate and at others much elongated. Their processes have numerous short, arborescent, and plumed collaterals. Two phases can be observed in them: first, a stage of contraction, in which the cell-body becomes augmented while the processes become shortened and the secondary branches disappear; secondly, a stage of relaxation, during which the processes of the neuroglia-cells are again elongated. Ramón Cajal maintains that the processes of the neuroglia-cells in reality represent an insulating or non-conducting material, and that during the period of relaxation they penetrate between the arborizations of the nerve-cells and their protoplasmic processes, and render difficult or impossible the passage of nerve-currents. On the other hand, when the processes of the neuroglia-cells are retracted, the various nerve-cell processes which they formerly separated from each other are now permitted to come into contact. To me it seems as though Ramón Cajal admits the very thing against which he contends. Evidently if the nerve-cell processes are not at one time in contact, and at another are in contact, they must certainly move, and the question at issue is self-admitted. It certainly does not matter whether the nerve-cell processes move little or move much, but that they move at all is the question at issue; and this, it seems to me, Ramón Cajal admits, although he makes that movement a purely passive one and dependent upon the interposition of the processes of the neuroglia-corpuscles. It is certainly a minor point

whether the movement of the nerve-cell processes is active or passive, though it seems that it is far from evident, from the histological facts at our disposal, that the neuroglia-corpuscles play the rôle of an insulating material. To me it further seems that a single positive observation outweighs all other negative observations, no matter how great the authority behind them, and this positive observation has actually been made. Wiedersheim[1] actually saw in the living animal *leptodora hyalina*, an entomostracan, the nerve-cells in the œsophageal ganglion move. The œsophageal ganglion may in one sense be regarded as the brain of the animal, inasmuch as it receives the fibres of the optic nerve, and Wiedersheim saw its cells move and change their shape. He describes the movement as slow and flowing. Certainly this observation possesses a profound significance. Even if the animal in which the phenomena were observed is far removed from the vertebrates, it must be remembered that it is just in lower forms that general biological truths must be sought for, and it is just in the lower forms that they have been found. I do not for a moment contend that the nerve-cells of vertebrates possess a gross amœboid movement as in the œsophageal ganglion of the entomostraca; but I do contend that it is in the highest degree probable that such facts as we have, scanty though they be, are in favor of the view that a certain amount of movement does take place in the terminal portions of their processes, their dentrites and their neuraxons, although this movement is probably small in extent.

Let us turn our attention for a moment to the subject of hysteria, and let us see what a flood of light is cast upon this subject heretofore so obscure and mysterious. Let us take the simple example of a hysterical paralysis, and see how easily it is explained. The neurons of a certain area of the cortex, for instance, retract the terminal branches of the neuraxon to such an extent that the latter are no longer in contact, or sufficiently near to the neurons in the spinal cord which supply the muscles of the paralyzed part. It explains also the marvellous

[1] Anatomischer Anzeiger, 1890, p. 673.

fact that a hysterical paralysis may at one time be so real, so genuine, as to be indistinguishable from a grossly organic paralysis, and yet the next moment upon a suggestion may absolutely disappear. This shifting of symptoms in hysteria, this sudden disappearance of paralysis or anæsthesia, can be explained by the view here advanced as it can be by no other. When power is suddenly re-established in a hysterically palsied limb, it simply means that the terminal branches of the cortical neuraxon, previously retracted, are again extended so as to re-establish the proper relations with the spinal neurons. Take again the example of a hysterical anæsthesia. How often do we see a segmental anæsthesia or a hemi-anæsthesia coming and going under the influence of no other stimulus than that which applies to the psychic make-up of the individual, namely, a treatment which we call mental or moral treatment, or that more powerful treatment, suggestion under hypnotism. It would be interesting indeed to follow out the ideas here brought forward in their application to the various phenomena presented by hysteria, its sensory, motor, and visceral stigmata. Even the hysterical convulsion, I contend, can be explained by the view here advanced. Time will not, however, permit more than to indicate the line of thought.

When we turn to hypnotism we can see what a ready explanation it affords for the phenomena presented. Under the fixed stare necessitated by the ordinary method of bringing about hypnosis and under the suggestion of sleep, the neurons are thrown into certain fixed relations with each other, corresponding solely to the ocular strain and singleness of thought induced. At the same time such relations of the neurons as ordinarily bring them into true contact with the outer world are suspended, probably by retraction of cell-processes. We can easily understand, in the light of the theory here advanced, how under hypnotic suggestion a hysterical paralysis disappears, or how under hypnotic suggestion anæsthesia is produced in this or that part of the body. Further, the various stages of hypnotism itself—lethargy, catalepsy, somnambulism —are all of them capable of a scientific explanation upon this

theory. Hypnotic lethargy, for instance, a stage so easily produced in the majority of patients, merely signifies that so general has been the retraction of the cortical neurons from each other that not only is sleep produced, but also a stage of general motor relaxation, due to the retraction of the terminal branches of the neuraxons in the spinal cord. In hypnotic catalepsy, on the other hand, the reverse obtains. Here the relations of the cortical neurons to the spinal neurons (contact or increased proximity, whatever it may be) are established to a degree beyond that which is normal, and the consequence is an enormous general increase of muscle-tonus. In somnambulism, again, certain of the neurons, especially those which stand in direct relation with the various sensory organs, form partial combinations with a limited number of other cortical neurons, so as to produce the various limited psychic phenomena characteristic of somnambulism, whilst the great bulk of the neurons of the cortex, the summation of whose action constitutes the ego and brings it into close relation with the outer world, have their processes retracted in sleep.

Leaving this interesting field, let us see for a moment of what enormous value this interpretation of cortical action is for normal mental phenomena. Sleep, instead of resulting from brain anæmia, or some other apocryphal condition of the circulation, merely means that when the substance of the cortical cells has been diminished by functional activity, which diminution we have reason to infer, from the researches of Hodge[1] (on the changes in nerve-cells in fatigue), there comes a time when the cell-processes are retracted, so that the neurons no longer stand in active relation to each other. Interchange of action cannot then take place, unconsciousness follows, sleep is established. Spontaneous wakening merely means that after nutrition has reached a certain point, a point where the wasted cell has been replenished, extension of the cell-processes again takes place, and interchange of active functional relations is re-established.

[1] Journal of Morphology, 1892, vol. vii. p. 95.

Numerous other ideas also suggest themselves in relation with the view here advanced. Take, for instance, a train of thought. This appears to follow *purely mechanical* lines. Thus a sequence of sound-vibrations impigning upon the peripheral auditory neurons, the auditory cells, produces in them a change, which in turn affects the relations which their neuraxons bear to the acoustic nuclei, and secondarily to the auditory cortical centres. The latter are not only affected by the impressions received from the afferent neuraxon, but they in turn react in such a way as to change their relations to each other, and the new positions assumed by them will depend largely upon the fact as to whether a similar sequence of impressions has passed through them before. If so, the old combinations will be reformed, and as a corollary the recognition by the ego of sounds as something heard before. From the cortical auditory centre there now pass through the general cortex a series of combinations among the neurons, also along the oldest and best-travelled lines, so that a given sequence of musical sounds may suggest at first a familiar air, and a moment later a vivid recollection of an opera once seen and heard. Here is the physiology of memory.

A startling thought which also suggests itself in connection with the theory of cortical action advocated in this paper is that *not all of the neurons are functionally active at the same time.* It is exceedingly probable that the number varies greatly. For instance, in fatigued states fewer combinations are made—fewer are possible—because of the exhausted condition, the diminished volume of the cell-protoplasm. After rest, on the other hand, not only are combinations more readily made, but a larger number of neurons are active. It is further probable that, in states of mental or emotional excitement, the number of neurons that are active and the number of combinations accordingly formed enormously exceed those occurring during ordinary mental states.

Many other thoughts also suggest themselves, and some are extremely interesting. For instance, the receptivity and marvellous adaptability of youth and early manhood appear to

depend upon the relatively great mobility of the cell-processes, while the retarded and restricted mental action so often seen in old age appears to be related to a much diminished mobility of these processes. Certain it is that the theory that the neuron is not an absolutely fixed morphological element renders clear and comprehensible many of the well-known facts of mental physiology. The application of this theory, for instance, to memory, sequence of thought, association of ideas, and even more complex mental processes is evident, but the limits of this paper have forbidden any but a mere mention of them.

DISCUSSION.

Dr. Charles K. Mills: It is possible that Dr. Dercum and I do not differ so much after all upon the subject of this paper, except in our interpretation of certain phenomena. The term cell employed by him does not appear always to have the same meaning. He explained at the commencement of the paper that he understands by the nerve-cell the body of the cell and all of its processes, and the general tenor of his paper is that the cell in this sense takes an active part in nervous phenomena. With this view I am in accord. It is the gray matter of the body which is trophic in function. According to the views of Nansen, it is not necessary to separate the nerve-cells into motor and sensory cells, and cells of special function. The body of the cell does not possess some special property of nervous action or initiation which is not possessed by the other parts. It is not uncommon to speak of the nerve-cell as a citadel of nerve-action, an idea related to the old metaphysical view that the cell is in some mysterious way sending everywhere its mandates. The paper is thoughtful and interesting; but it does not convince me that the gray matter of the cell is other than trophic in function. Certain functions can be properly said to reside in parts of the brain, but they reside in aggregations of cells, and are the result of movements of the framework and processes of the cells.

Dr. Dercum: I used the term neuron as meaning the entire nerve-cell; the cell-body and all of its processes, dendrites and neuraxons. I think that the term cell had better be restricted to the old meaning, according to which we speak of cells or nerve-fibres. The view of Nansen, as I understand it, is that nerve-action goes on entirely without any relation to the nerve-body, and that this body simply exists for the purpose of nourishing the nerve-processes. It seems to me that this is as unphilosophical as if we should say that an amœba exists only for the nourishment of its pseudo-psoas, or that the body

of a man exists only for the sake of his extremities; although in a certain sense the trunk is trophic to the limbs.

I cannot bring myself to the view that the cell-body is entirely passive in nerve-action. I do not see how nervous energy can be produced unless the cell-bodies are taken into account.

What occurs during sleep, if it does not mean restoration of power to th cell? What is meant by the experiments of Hodge upon the changes which occur in nerve-cells during functional activity? Do they not imply that the centre of activity is in the cell?

The cell-body and cell-processes are of course equally important, and while I am willing to admit that the cell-body is in a certain sense trophic, it is quite certain that it has other functions in addition to this nutritive one.

A CASE OF SURGICAL INJURY TO THE URETER.

By J. M. BALDY, M.D.,
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[Read February 5, 1896.]

During the early part of December, 1895, Mrs. E. W. consulted me concerning some abdominal trouble from which she had been suffering for about five years. Her ailments began subsequent to her last confinement, and she had since that time been a chronic invalid, spending much of her time, at intervals, in bed.

At the time of her visit an examination disclosed an irregular mass, filling the whole of the pelvis and rising in the abdomen to a point midway between the pubis and the umbilicus. By abdominal palpation the tumor conveyed the sensation to the hand of a mass of intestine and omentum agglutinated, and the impression was given that the trouble was one of extreme, and at the same time chronic, pelvic inflammation with accompanying adhesions. The vaginal touch revealed a rounded circumscribed cystic mass. No effort was made to arrive at an exact diagnosis, these conflicting diagnostic points being simply noted.

Several days later the abdomen was opened and the following conditions found. To the right and extending to the left past the median line a cystic tumor presented; beyond this, filling the left side of the pelvis, was a mass of adherent intestine. Neither bladder, uterus, nor the uterine appendages could be distinguished by the most careful examination. An

effort was first made to tie the broad ligament down to the right pelvic wall, but soon it became apparent that this procedure presented so many difficulties that the adhesions on the left side of the pelvis were broken up and a tumor which was evidently a Fallopian tube or ovary, or both, distended and cystic presented. The broad ligament on this side was completely obliterated by the inflammation and an effort to proceed with the enucleation here soon forced the conviction that the ureter and deep vessels would most probably be damaged if that accident had not already occurred. The only hope of completing the operation now lay on the right side, and the attack was accordingly resumed at this point. It had by this time become evident that the mass on that side was an intra-ligamentary cyst. After some most difficult and anxious work with the scissors and ligatures the cyst was enucleated, the broad ligament tied off close to the pelvic wall, and the uterus amputated at about the internal os. The Fallopian tube and ovary on the left side were then removed. In doing so, however, the end of the Fallopian tube, which was intimately attached to the sigmoid flexure, was freed and about three ounces of pus deluged the whole field of operation. Fortunately the pus was old and consequently sterile, else the woman would have inevitably perished from septic infection, so enormous were the surfaces which had been denuded of their peritoneum. A close examination disclosed what I feared had happened. The kidney-end of the ureter was found in a mass of shreds lying well above the ilio-pectineal line, in the false pelvis. The bladder-end was buried somewhere in the inflammatory deposits and could not be found. No time was lost looking for it, but the kidney-end and the uppermost movable part of the bladder were approximated for the purpose of seeing whether or not they could be made to meet. This was found possible, but resulted in considerable traction on the ureter—too much for safety. The choice of stitching the ureter to the abdominal wound, removing the kidney, or fixing the ureter in the bladder, presented themselves. The first two thoughts were rejected as being unsurgical, and the latter one

adopted. I was the more impelled to this view inasmuch as I had already assisted at two similar procedures, both of which proved successful, but neither of which gave as little promise of success as this case.

The ureter an eighth of an inch from its end was perforated by a double suture at two points, both ends of the catgut protruding from its open end. The bladder having been incised to the extent of an inch at the point which was most easily brought into contact with the ureter, the two ends of the catgut suture were successively carried into the bladder, and an eighth of an inch from the incision were made to penetrate the bladder-walls and protrude from its peritoneal side. The two ends were now tied, thus drawing the ureter into the bladder and there fixing it. Two such sutures were placed for the sake of additional security. The mucous membrane of the bladder was now united by a continuous catgut suture, then the connective tissue, and, finally, the peritoneum by a separate continuous catgut suture. Care was taken to pass each suture through the outer coat of the ureter as it passed by it, for the sake of the more accurately closing the wound about the ureter, and for the additional reason of the more certainly securing the ureter from being pulled from its position. In order to relieve all tension on the ureter, which was considerable at this time, two stout catgut stitches were made to fix the bladder securely to the pelvic wall at the point of the stump of the ovarian artery.

Peritoneum was brought together over all denuded parts of the pelvis possible, a glass drainage-tube was placed, and the abdomen closed.

The patient went to her bed with a temperature of 99° and a pulse of 100. The only time her temperature rose above this was at the end of the second day previous to her first bowel-movement, when it registered 101°; the pulse never rose above 100. The drainage-tube was removed the third day. The first four days she was catheterized every four hours. The first twenty-four hours she secreted nineteen ounces of urine; the second, twenty-six ounces; the third, thirty-one or more

ounces, and then rapidly increased to normal. At no time was there any occasion for anxiety in her convalescence, and she returned home a well woman at the end of four weeks.

Just prior to her departure a cystoscopic examination of the bladder was made. The point where the bladder was dragged upon by the sutures showed plainly in the drawn-up, corrugated appearance at that point. The point where the ureter entered the mucous membrane was deeply injected; the surrounding area was normal. Urine was seen to flow normally from the ureteral opening, which protruded above the surrounding level of the mucous membrane. The patient at no time seemed to suffer from irritability of the bladder. A urinary examination was practically negative.

DISCUSSION.

Dr. Charles B. Penrose: The first case to which Dr. Baldy referred occurred in my own practice about two and a half years ago. It was a case of abdominal hysterectomy for scirrhous cancer of the uterus. The ureter was intentionally divided and was afterward thrown into the bladder in the manner in which Dr. Baldy has followed in his case. The operation was similar to and was derived from the method adopted by Dr. Van Hook in his experiments upon lateral anastomosis of the ureter. A year and a half after the operation my patient was in good health.

CONGENITAL EROSION AND SPLIT OF THE CERVIX UTERI.

By C. B. PENROSE, M.D., Ph.D.,
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[Read February 5, 1896.]

I PRESENT this paper to the College of Physicians in order to direct attention to a condition of the cervix uteri in virgin and sterile women which I think is not by any means generally recognized, and to obtain from the members of the College some information from their own experience, for since my attention has been directed to this subject I have talked of it with several physicians in general practice, and a few of them had seen cases which puzzled them and which they thought belonged to the class of cases which I am about to describe—under the name Congenital Erosion and Split of the Cervix Uteri.

A few text-books on gynæcology refer to this congenital condition. The only papers upon the subject of which I have any knowledge are by Leopold in 1872 and by Fischel in 1880.

Fischel's paper is called a contribution to the morphology of the cervix uteri. As the explanation of the cases which have occurred in my own experience is furnished by this paper, I have added a short abstract of it which Dr. Lawrence S. Smith has very kindly made for me.

A CONTRIBUTION TO THE MORPHOLOGY OF THE CERVIX UTERI.

During the course of a series of investigations on the cervices of infants who had been stillborn or who had died soon after birth the author's attention was called to a condition which, so far as he knew, had never been de-

scribed by any anatomist or gynæcologist that had undertaken the study of this part of anatomy, namely, the occurrence of erosions. A short time before he had discovered by accident in the *Transactions of the Gesellschaft für Geburtshülfe*, in Leipzig, July 15, 1872, a communication by Leopold, stating that he had seen such an erosion of the cervix, and declaring it to be an anomaly in the newborn child heretofore unrecognized. In the debate that followed, Ahlfeld stated that circulatory congestion in the uterus and, apparently, also erosions of the mucous membrane were a frequent occurrence in asphyxiated infants. (*Archiv f. Gynäkol.*, B. v., S. 162).

From this short notice Fischel judges that neither Leopold nor Ahlfeld had ever subjected these erosions to a microscopic examination. He therefore publishes the investigations he made and also the conclusions he reached as a result of them:

"On twenty-eight cervices examined he found ten erosions of varying character and size; of these ten cervices, four were from fœtuses stillborn at term, two from infants a few days old, one from an infant fourteen days old, and three from infants three, four, and five weeks old, respectively. From the eighteen cases in which no erosion of any kind was found, five were stillborn at term, one a few days old, one nine weeks, one thirteen weeks, two eighteen months, and one two and one-half years old. The others came from fœtuses in the sixth, seventh, eighth, and ninth month of intra-uterine life."

From these cases he found that the assertion of Ahlfeld (see above) had no value as far as cause and effect between asphyxia and erosion were concerned, since, of the five children born asphyxiated, none showed any erosion, while some did that died at varying periods after birth:

"The appearence which the erosion on the infantile cervix presents varies both in extent and in the form of the change. In most cases the external os forms a rather narrow transverse opening surrounded by a reddened, velvety area 3–4 mm. wide. In other cases the erosion extends onto the lateral surfaces of the cervix higher up than on the anterior and posterior aspects. In other cases still, and these bore the nearest resemblance to erosions in the adult, the change was limited to the under surfaces of the lips of the cervix as far as they came in contact with the posterior vaginal wall."

He points out that with the naked eye two forms of erosion may be distinguished: one with a satiny appearance, another of a rougher, more granular character, recognized as papillary. Microscopically, the papillæ, instead of being protected by an even covering of squamous epithelium, stand out separately in a more or less irregular arrangement. Covering the uneven surface thus formed is a single layer of cylindrical epithelial cells. On the ends of the papillæ the cylindrical form is replaced by a flatter, more cubical one, but everywhere the layer is single. There is no transition form between squamous and cylindrical epithelium; but the line of demarcation is always sharply defined, so that, for example, one side of a papilla may be lined with stratified squamous, the other with simple cylindrical epithelium. In many

places compound glands, acinous in character, open into the depressions between the papillæ, and into these glands the simple columnar epithelium dips down. The mucosa itself is composed, as usual, of a connective tissue rich in nuclei.

To sum up, he concludes "that in almost 36 per cent. of newborn infants the vaginal surface of the cervix from the external os toward the vaginal fornices is covered more or less extensively with a mucous membrane, which, from the form of its epithelium, from its less papillary character, and from its possession of mucous glands and crypts, must be regarded as a direct continuation of the cervical mucous membrane.

"The dividing line between the epithelium of the vagina and that of the uterus does not lie, as we are led to believe by all previous investigators, even the latest, Klotz, at the outermost end of the cervical canal, but may be situated even on the external vaginal surface of the cervix more or less high toward the vaginal fornices. For this condition I adopt the name congenital histological ectropium.

"This dividing line between the two forms of epithelium lay, in the greater number of cases, within the cervical canal 2–3 mm. above the external os, and coincides with the external os in only a minority of cases."

The degree of development of glands in the cervical canal and on the outer surface of the cervix varies greatly in different individuals, as does also that of the palmar plicatæ within the cervix. In some these glands were exceedingly well developed, but where the surface was covered with squamous epithelium he found no trace of glands of any kind.

He accounts for the formation of this ectropium by the theory that, after the formation of the uterus and vagina by the union of the lower segments of the ducts of Müller, which are lined with a simple columnar epithelium, a change begins at each end in the mucous membrane. In the uterus this change consists in a development of a glandular system, while in the vagina, beginning at the uro-genital sinus, the columnar epithelium gradually changes into the squamous variety. At the termination of intra-uterine life this change should have reached the external os, but owing to the varying rapidity with which it progresses in different individuals the point which it reaches varies, being sometimes higher, sometimes lower than normal. If the squamous epithelium reaches the cervix before any glandular development has taken place in its mucosa, no glandular openings are found on its surface, nor are any glandular formations found beneath it. If, however, the columnar epithelium has already begun to send down processes into the mucosa before the squamous metamorphosis overtakes it, these glandular structures persist and may develop further. This theory accounts for the histological ectropium, and also the presence of glands in the vaginal wall that Preuschen has described.

In regard to the connection between the histological ectropium and erosions and other pathological conditions he says: "It must be acknowledged as

possible that erosions occur in adults when the individual has received a predisposition to it during the period of her development. It is, furthermore, to be conceded that this congenital histological ectropium of the cervix may be covered over by squamous epithelium, but still retains under this covering the glands and other attributes of a cervical mucous membrane. If now, through some inflammatory process, the tissues become congested and infiltrated with round cells, the acquired superficial (squamous) epithelium will be shed, and the original columnar epithelium be brought to light, presenting the complete picture of a true œdematous or papillary erosion, a condition that differs from the normal cervical mucous membrane only in its greater succulence and in the richness in cellular elements.[1]

"However, I will admit that, as I have stated in my paper on erosions, the formation of the erosion may occur on a spot normally covered with squamous epithelium. But when I consider that even in adults the erosion never passes beyond the limits which we have recognized as originally those of the cervical mucous membrane (the highest boundary in my cases lay approximately midway between the external os and the fornix vaginæ), it becomes more and more evident to me that of women whose cervices are intact, those only will have erosions who are predisposed to them by this congenital condition which I have described."

He believes that the persistent and almost incurable forms of catarrh, for which Schröder has advised excision of the mucous membrane, are the result of a predisposition seated in the congenital hypertrophy of the "arbor vitæ" and its glands.

After a description of the normal cervix with its transversely oval os and its anterior and posterior lips united by the lateral commissures, he alludes to the injuries usually inflicted on it in labor and to the changes that these injuries produce in its form and appearance until the laceration ectropium described by Emmet is formed.

"I am now able," he says, "to show a photographic representation of the cervix of a newborn infant which presents an inferior degree of this condition. The separation of the lips does not extend all the way to the vaginal junction, but concerns only the lower two-fifths of the lateral corners. Nevertheless, the two lips deprived of their commissures gape open, the crest of one being 9 mm. from that of the other, exposing the cervical surface of both lips for a distance of 5–6 mm. This case shows that a peripheral notching of the cervix is not always a sign of a previous labor, but may represent a condition of the cervix in pregnant women whom we were forced to consider primiparæ not only through their own statements, but also from the condition of the external genitalia. This case is of great forensic importance in that the proof of a former labor can no longer be claimed for such a condition of the cervix."—*Archiv f. Gynäkologie*, 1880, Bd. xvi., p. 192.

[1] Virchow's Archiv, B. 70, S. 116. "Ueber Cystenbildung in der Vagina."

It will be observed that there are two distinct conditions described by Fischel—a congenital erosion and a congenital split of the cervix, and the former is much the more frequent lesion, occurring to a greater or less degree in 36 per cent. of the infantile cervices which he examined.

I have had no opportunity of studying the cervices of infants, but I have met one undoubted case of congenital split of the cervix in a virgin, and three cases of disease of the cervix in young women, which I think may be explained by the presence of the congenital erosion described by Fischel.

I have described the first case in detail, because in it the cervix was amputated and submitted to microscopic examination.

Case I.—N. S.; white, aged twenty-five years, single. Menses began at fourteen years, occurred every twenty-eight days, and were of four days' duration. She had suffered for five years with profuse leucorrhœa, backache, and slight left ovarian pain. She was a well-developed, strong woman. Careful questioning and observation rendered it most probable that she was virtuous.

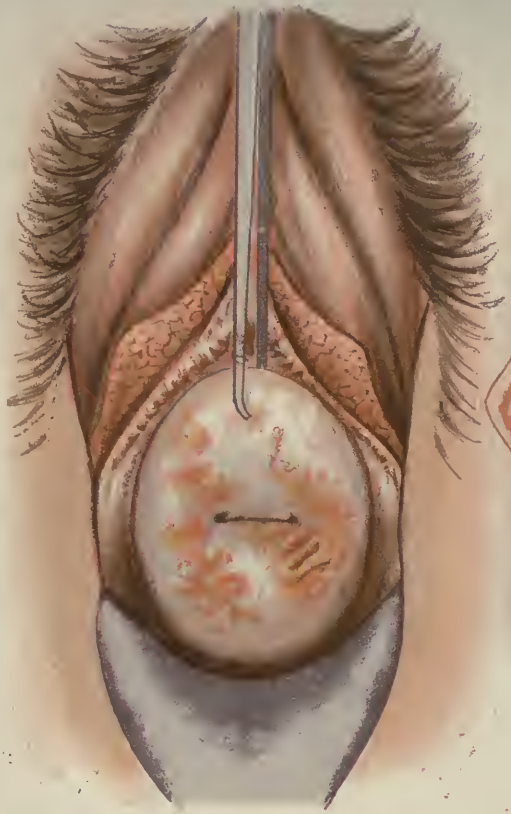
She had never had local gynæcological treatment.

The ostium vaginæ was virginal. On the posterior margin there was a crescentic hymen, which was not, however, sufficient to prevent coitus. The vagina was small and virginal. The vaginal cervix was mushroom-shaped (see Plate, Fig. 1). The face of the cervix was flat, or very slightly evenly convex. The face of the cervix projected (like the top of a mushroom) on all sides beyond the upper portion, which corresponded to the stalk of the mushroom. The face (see Plate, Fig. 2) of the cervix was round and about one and a half inches in diameter. In the figure it is oval on account of the traction from the tenaculum. The external os was transverse — one-third of an inch broad. Upon the face of the cervix were several scattered patches of erosion.

The cervix was amputated and microscopical examination was made by Dr. Lawrence S. Smith.

The cervix was covered with squamous epithelium, except on the small patches of erosion where cylindrical epithelium was present. Racemose glands (like the normal glands of the cervical canal) opened all over the face of the vaginal cervix, in front, behind, and to the sides of the external os. They were found as far as one-half to three-quarters of an inch from the external os. These glands opened on the vaginal aspect of the cervix, where it was covered with squamous epithelium, and this epithelium extended to

Fig. 1.



Congenital erosion, Case I.

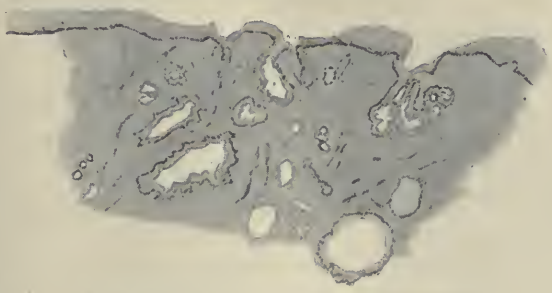
Fig. 2.

Congenital erosion, Case I.

Fig. 3.

Congenital split of the cervix, Case II.

the ducts of the glands, which were lined with cylindrical epithelium. The vaginal cervix was, in fact, a glandular structure.



Microscopical section of vaginal cervix in Case I.

It will be remembered that normally no glands whatever open on the vaginal aspect of the cervix uteri.

The erosions which are usually seen in practice are those which accompany an inflammation of the mucous membrane of the body or neck of the uterus, and which are caused by the irritating discharge, and those erosions, by far the most frequent and pronounced, which are due to laceration of the cervix with eversion of the lips. In the cases of the first class there is no alteration in the general shape of the cervix. There are no glands discharging upon the vaginal aspect of the cervix, unless there be present a prolapse of the cervical mucous membrane.

In the cases of the second class, those due to laceration, the shape of the cervix is altered and there is a marked erosion, which is caused by the exposure of the normal mucous membrane of the cervical canal, and perhaps by some proliferation from irritation of the cellular and glandular elements of this mucous membrane.

The differences between the condition found in the case which I have described and that present in a case of bilateral laceration with ectropion of the cervix uteri may be stated as follows:

In the laceration there is a history of pregnancy. The face of the cervix is oval, the antero-posterior axis being the longer.

The angles of laceration are marked either by a depression on each side of the apparent external os or by a palpable plug of cicatricial tissue. The ectropion is antero-posterior; there is no lateral ectropion.

In the condition in Case I. there had been no pregnancy. The face of the cervix was round, plane, or very slightly uniformly convex. There was no indication of any angle of laceration, macroscopically or microscopically.

The cervix is mushroom-shaped. The ectropion is lateral as well as antero-posterior.

It seems probable that the condition which I have described is distinct and congenital, and is due to the development upon the vaginal aspect of the cervix of those structures which are normally confined to the cervical canal.

It will be remembered that Fischel found such a condition in 36 per cent. of the infants examined by him. But most of these erosions were slight in extent, and would certainly have given no trouble if they had persisted to adult years. It is probable that many of the slight erosions not caused by cervical catarrh, which are found in young girls, may be explained by Fischel's theory. Such erosions are common in cases of congenital anteflexion, and it is in such cases of imperfect development of the uterus that one should expect to find imperfection in the development of the external os.

When, however, this congenital erosion is present and persists over the greater part of the vaginal cervix, as in one of Fischel's cases, the condition which I have described may be produced, and symptoms will be caused by it which are similar to those following bilateral laceration of the cervix with ectropion.

The shape of the cervix in the case which I have reported is peculiar. If the condition is, as I have attempted to show, caused by the congenital growth of the mucous membrane of the cervical canal over the vaginal aspect of the cervix, or, in other words, by a defect in the development of the external os uteri, one would expect to find a change in in the normal growth, and hence in the adult shape of the cervix.

I have observed a similar condition of the cervix uteri in two other cases—one a married woman of thirty years who had never conceived, and the other a probable virgin of twenty-one years. As in these cases the cervix was not amputated, I was unable to make a microscopical examination to prove its glandular character; the macroscopical features, however, were similar to those of the case already described.

The proper treatment for such cases is amputation of the cervix. Complete relief from all symptoms followed this operation in the case here reported. In one of the other cases I performed an operation similar to trachelorrhaphy, cutting out the lateral portions of the cervix, and attempted in this way to restore the normal shape of the cervix. But the woman derived little or no benefit from it.

Case II.—C. W., aged seventeen years, a modest school-girl of respectable parents. Careful questioning of her mother, father, and family physician rendered it extremely probable that the girl was virtuous. She had never had any local treatment of the uterus. She came to the University Hospital on account of painful and frequent urination. She was etherized and an endoscopic examination of the bladder was made. The appearance of the interior of the bladder suggested tubercular cystitis, though the disease subsequently yielded to local treatment.

While the girl was under ether an examination was made of the vagina and uterus. The ostium vaginæ was very small, and there was a well-formed annular hymen, which with difficulty admitted the little finger. Introduction of the index finger ruptured the hymen. There was a bilateral split of the cervix which was most marked on the left side. The depth of the split on the left side was three-eighths of an inch. There was no ectropion. There was an erosion surrounding the os. The uterus was in the second degree of retroversion. The integrity of the hymen was not regarded, because it was thought that the retroversion would require correction. There was no leucorrhœa.

The appearance of the vaginal cervix is well shown in Fig. 3 of the Plate, which was made from life. The macroscopical appearance of the cervix is in all respects similar to that seen after laceration from abortion, miscarriage, or labor; though the case reported was an undoubted case of congenital split of the cervix.

As pointed out by Fischel, the importance of such cases is very great from a medico-legal point of view.

DISCUSSION.

Dr. B. F. Baer: I have seen many erosions, after menstruation had begun, however, but I do not think that I have ever seen a congenital split of the cervix, unless some of those cases in which the anterior lip seems to be much larger than the posterior lip might be considered cases of this kind. I have not seen any in which I thought it necessary to operate by cutting out a wedge and drawing the edges together.

Dr. E. E. Montgomery: I wish to add no more than a word to show my appreciation of this very valuable paper, especially from the standpoint of forensic medicine. Dr. Penrose has given us a very important paper from this standpoint, and has demonstrated that fissures of the cervix cannot be considered as evidence of a previous pregnancy.

Dr. Geo. E. Shoemaker: I will merely call attention to the great difficulty in being sure that an adult patient is a nullipara. There are conditions in which it is almost impossible, from a physical examination, to decide absolutely whether or not a child has been born. I have such a case under my care at present. This paper of Dr. Penrose's is very interesting, especially from the point of forensic medicine. The condition must be an exceedingly rare one, but it leads us to be still more careful in making a decision in cases where a previous pregnancy is in question.

SUPRAVAGINAL HYSTERECTOMY FOR IMPOSSIBLE LABOR, WITH INTRAPELVIC TREATMENT OF THE STUMP.

By B. F. BAER, M.D.,
PROFESSOR OF GYNÆCOLOGY IN THE PHILADELPHIA POLYCLINIC.

[Read February 5, 1896.]

I. The Technique of the Operation.

In opening the discussion upon the technique in hysterectomy for impossible labor, it would not be profitable to enter extensively into the early history of this subject, for the profession is already quite familiar with it. Nor have I anything new to present, as the technique which I shall describe and recommend will be practically the same as that which was advocated in the operation for fibroid tumor, in a paper read before the American Gynæcological Society in 1892,[1] and which has been generally accepted as the best method of treating the stump in all cases where supravaginal hysterectomy is indicated in the non-pregnant uterus.

The advantage of dropping the cervix within the pelvis and leaving it in its natural position and relations had long been recognized; but when the cervical tissues were ligated *en masse* or in sections, as was practised by Schroeder and his followers, the mortality from hemorrhage and sepsis was so great that the extraperitoneal method of constricting the stump with a serre-nœud, and fixing it in the lower angle of the abdominal incision, became and remained the method of expedi-

[1] "Supra-vaginal Hysterectomy Without Ligature of the Cervix. A New Method." By B. F. Baer, M.D., Trans. American Gynecological Society, 1892-1893.

ency until it was shown that hemorrhage could be controlled and sepsis obviated by a procedure which left the cervix entirely free and intrapelvic. The mortality of this intrapelvic method is at *least* as low as that of the extraperitoneal fixation method, and the advantages are so infinitely greater that no one who has had experience with it could be induced to return to the older way.

That this method could be safely applied in the Porro-Müller operation I was at once convinced, for the first case upon which I operated was one of pregnancy at the fifth month, where labor was rendered impossible by the presence of a fibroid tumor which impacted and obstructed the pelvis, and in which the symptoms became so urgent that radical measures for immediate relief became imperative. This was not a full test, I grant, for the tissues of the cervix had not yet attained the size and vascularity which obtain at the full term of gestation. But later experience has fully established this question, for uniform success, I believe, has followed in all the operations at full term in which the cervix was treated in this way, and the recovery of the patients was as uneventful as so usually occurs in the removal of the uterus in the non-pregnant state by this method.

The question as to the choice of the operation will be discussed by my colleague, Dr. E. P. Davis. I will therefore proceed at once with a description of the technique, and follow with a brief review of the first case, and a report of one at full term.

In order that the best success may be won, it is necessary that the diagnosis of impossible labor and a decision as to the choice of the operation shall be made previous to the full term of gestation, or at least before labor has begun, so that the environment and preparation of the patient may be rendered as perfect as possible. It is also necessary that efforts at delivery *per vias naturales* should have been avoided. The same arrangements should be made, if possible, as to the operating-room, Trendelenburg apparatus, and other operative equipment as for ordinary hysterectomy in fibroid tumor, and two

more assistants are required than for the former operation: One to control hemorrhage by grasping the broad ligaments and cervix, the other to take the child from the hands of the operator as soon as it is delivered. If the patient does not object, she should be placed on the table before the anæsthetic is begun. The assistants and nurses should be previously informed regarding their various positions and duties during the operation, so that nothing may occur whereby the life of the child might be endangered. When the patient is anæsthetized the operator takes his position on the right side of the patient, his instrument-tray being close to his right hand. Two assistants stand opposite; a third stands at the right of the operator, ready to receive the child. An incision, long enough to deliver the uterus, is now quickly made and observation is taken as to the presence or absence of adhesions. If any adhesions exist they must be separated before the uterus is delivered. The organ is then tilted slightly, so that a cornua emerges, when the remainder passes through easily. As soon as the uterus emerges an assistant immediately brings the edges of the abdominal incision together under it. A large sterilized gauze-pad, which has been prepared for the purpose, is then placed under the uterus. This protects the abdominal cavity and serves as an absorbent of the discharges from the fœtal envelope. The other opposite assistant quickly encircles the broad ligaments and cervix with the left hand and makes sufficient constricting pressure to control hemorrhage. Incision is next quickly and carefully made through the uterine wall in the median line, beginning near the fundus and extending downward. The right hand now ruptures the membranes and seeks the feet of the child, by which it is delivered. If the placenta happens to be in the way it is pushed aside or broken through, and no other attention given to it at this moment. The child is passed to the assistant in waiting to receive it, when the cord is clasped by a hæmostatic forceps and severed; such measures as may be required for the resuscitation of the child being at once applied by the assistant in charge of it. The placenta is next delivered and the uterine cavity thor-

oughly emptied and cleansed. The uterus will now probably be found firmly contracted, and the operation may be continued without attention to the uterine incision, the assistant still grasping the pedicle.

When ready to proceed with the hysterectomy, the pelvis should be elevated, but not to the extreme degree that is called for in the Trendelenburg posture. The latter is seldom necessary, and may be harmful. Careful examination should now be made so that a clear idea may be obtained as to the location and relation of the broad ligaments before the ligation is begun. This is especially necessary if the labor had been rendered impossible because of fibroid tumor. The first step in the hysterectomy is the passing of a single silk ligature through the broad ligament near the cervix, which, being tied, controls the ovarian artery and veins. The ligament is then severed just below the tube and ovary, the incision being carried close to the cervix. The knife is then run lightly across the lower segment of the uterus, an inch or two above the peritoneal reflection of the bladder, care being taken to incise the peritoneum only. The latter is then stripped down with the handle of the scalpel. The purpose of this is twofold: first, it insures protection to the bladder and forms the peritoneal fold which is to cover the raw end of the cervix after the uterus has been amputated; and, second, it facilitates the next and most important step, viz., the ligation of the uterine artery. If the artery is prominent and easily reached, it may be ligated separately within the folds of the broad ligament. But if it is deeply situated and cannot be easily isolated, which is often the case, the finger and thumb then grasp the broad ligament on its anterior and posterior surfaces and locate the vessel by its pulsation. A ligature is then passed through the entire broad ligament below the artery, and just outside of but close to the cervix, care being taken to avoid the cervical tissue on the one hand and the ureter on the other. The ligature is now tied. Similar steps are taken to secure the vessels on the opposite side and the cervix is then amputated just above the vaginal attachment. A small posterior fold is formed by strip-

ping up the peritoneum while the amputation is being made. The stump is now held in the grasp of a small tenaculum forceps until the technique is finished. As a rule, if the main arterial branches have been properly ligated the raw end of the cervix will be found dry, but if any hemorrhage is present, of course additional measures must be taken to control it. If any vessels are found spurting they must be ligated. If oozing from the stump is general and persistent, which is more likely to be the case in the puerperal cervix—it is very rarely so in the non-pregnant—catgut sutures should be passed through the cervical tissue to control it. These sutures must be placed so *as not to include* the peritoneal folds, and are to be covered by these folds in the final technique. They should also be placed on each side of the cervical canal so that it may not be occluded. When all bleeding has ceased the peritoneal folds are closely adjusted over the stump, and as many Lembert sutures are placed as are necessary to maintain this *close* adjustment. The number required will depend upon the manner in which the uterine arteries were ligated. If the ligatures securing these arteries have also passed through the broad ligament, the peritoneal folds will be found taut, so that when drawn over the stump they will fit closely and press firmly against each other. Under these circumstances the adjustment may be so firm that further suturing is unnecessary, the edges being merely enfolded. But if this firm and close adjustment does not exist, then, of course, it must be secured by as many Lembert sutures as are, in the judgment of the operator, necessary. Nothing whatever is done to the cervical canal if the tissues are in a healthy state, but if efforts at delivery had been made, or if the child had been dead and septic discharges have been occurring, the canal and vagina must be thoroughly disinfected. The stump is now released, when it immediately recedes into the pelvis and occupies its normal position. After toilette of the peritoneum, the abdominal incision is closed and dressed in the usual way. Drainage is almost never necessary.

In the original description of the technique the following

sentence occurs: "The steps of the operation vary somewhat, to suit the complication which may be present in the individual case, but the general direction and the conclusion are practically the same in all cases."[1] If it had been thought necessary to elaborate this statement it would have been written somewhat as follows: The termination of the technique by which the cervix is left without a ligature in its tissues, the cervical canal undisturbed, and the stump securely covered under the peritoneal folds, is not always accomplished and completed by the same routine. For instance, it might be most convenient to begin by first ligating on the right side. If not so, begin on the left. In another case it might be deemed best to grasp the ligaments, including the bloodvessels, with a clamp-forceps, sever the ligaments, amputate the cervix, and then place the ligatures, with the uterus out of the way. At another time it might be deemed best to ligate one broad ligament, sever it and amputate the cervix, and then grasp and sever the vessels and ligaments on the other side, thus completing the technique again, with the uterus out of the way. Each case should be managed by the steps which will best facilitate the conclusion of the operation as described.

Case I. *Supravaginal hysterectomy for fibroid tumor complicating pregnancy and rendering labor impossible.*—Mrs. H., aged thirty-seven years, was married in February, 1891. Menstruation had become rather profuse during the two preceding years, but the patient considered herself in good health until five months after her marriage, when she began to experience pelvic pressure-symptoms. Her catamenia had been suppressed in June. About September 1st she was suddenly attacked with severe pain in the pelvis and along the course of the sciatic nerves. She also suffered severely from rectal and vesical tenesmus. I first saw the patient on September 28th. She was then extremely anæmic and appeared to be in great distress. The abdomen was distended by an irregular tumor which extended above the umbilicus. The tumor mass was in two parts, being larger on the right side and separated by a sort of hour-glass constriction. The mass on the right side was rather globular and conveyed a boggy, semi-fluctuating sensation, while that on the left was quite firm, at one point having a projection of almost bony hardness. Vaginal examination revealed the pelvis to be occupied by a firm, hard tumor larger than a child's head. It entirely filled the pelvic cavity and was immovably fixed. The cervix uteri could not at first be found, but it was finally located

[1] Ibid.

above the transverse ramus of the pubic bone and almost out of reach of the finger, where it was flattened between the bone and the tumor. By combined palpation the globular mass on the right side was shown to be continuous with the cervix. The usual mammary changes of pregnancy at the fifth month were present, and there was a well-marked uterine bruit. The diagnosis of fibroid tumor complicating pregnancy and rendering labor impossible was established.

The great suffering and danger of the patient made it imperative that steps should be at once taken for her relief, and she was transferred to the Polyclinic Hospital on the next day, September 29th.

Operation, October 2, 1891: After anæsthesia, I endeavored to dislodge the tumor and elevate it into the abdominal cavity, with the hope that the pregnancy might go to term, but failed, and therefore decided to make cœliotomy. I began by making an incision three inches in length, when the pregnant uterus was exposed to view. The organ was above and resting on the right side of the tumor, being connected with the latter by a pedicle about an inch in diameter. The left broad ligament and the tube and ovary were stretched over the tumor. Passing my hand beneath the uterus and over the pelvic mass, I found the latter very firmly fixed in the pelvis, not, however, by inflammatory adhesions. The incision was now slightly increased, when the uterus emerged from the abdominal cavity. The tumor was then dislodged after great effort and rotatory movement. The propriety of removing the tumor and leaving the pregnant uterus was now considered, but further examination showed that the organ contained another tumor imbedded in its wall; there were also several malignant-looking white protuberances on its surface. I therefore determined upon hysterectomy. The operation was concluded by the technique described, although the different steps were not carried out in the same order, for it was during this operation that the method was evolved. In this case the peritoneal folds were secured by a row of Lembert sutures. The patient made an uninterrupted recovery, being apparently convalescent from the beginning. I examined this patient four years after the operation and found her in perfect health.

Case II. *Supra-vaginal hysterectomy for impossible labor in a woman who had been delivered by the Cæsarean section eighteen months previously.*—Mrs. E. H., aged twenty-seven years, entered the Polyclinic Hospital by direction of my colleague, Dr. E. P. Davis, on January 14, 1894, in labor. The patient had been examined some time previously by Dr. Davis, when it had been determined that the successful delivery of her child would be impossible without operative aid.

"Examination of her pelvis at this time gave the following measurements:

	Cubic centimetres.
Anterior superior spines	28
Crests	30
Trochanters	29 5
External conjugate	19.5

"Vaginal examination showed the rami of the pubis approximating each other more closely than normal. Palpation of the inner surface revealed a funnel-shaped pelvis, the cavity narrowing very appreciably toward the outlet. In comparison with the breadth of the patient's shoulders and the width of the iliac bones, it was seen that she had a flattened and converging pelvis."

"This was her sixth pregnancy. Her first, third, fourth, and fifth labors had been terminated by the use of forceps, each labor resulting in the birth of a dead child. All of these stillborn children were large, weighing over twelve pounds. The second pregnancy resulted in the spontaneous delivery of a living male child, after a very severe labor, but this child happened to be quite small."

Some hours after her admission, Dr. Davis kindly requested me to see the patient in consultation with him and Dr. R. P. Harris. The question of symphysiotomy *versus* Cæsarean section had been discussed before my arrival, and for reasons stated by Dr. Davis, in his report of the case, the latter operation was favored; Dr. Harris at first favored symphysiotomy, but the apparently large size of the child and the diagnosis of breech presentation, together with the peculiarly deformed pelvis, had caused him to change his view. I very readily concurred in the wisdom of this choice and had the pleasure of aiding in the operation, which was immediately undertaken. The child, a female, weighed about twelve pounds. The patient and child both did well.

A year later Mrs. H. feared that she was again pregnant, and examination revealed that she was about three months advanced. She was urged to keep herself under observation so that premature labor might be induced at the proper time, should it be deemed advisable. The relative risks of this operation, in view of the recent Cæsarean section, were explained to her.

She did not favor the premature labor, largely because of the greater danger to the child, and for the additional reason that she wished to be protected from the risk of future pregnancy should it be again necessary to make abdominal section. She did not again report until near the full term, when she was transferred to my care. She entered the Polyclinic Hospital on July 9, 1895, a week before full term. The abdomen was greatly distended and the child was evidently large. The breech appeared to be in the right iliac fossa, and the heart-sounds were best heard about three inches above and to the right of the umbilicus. The uterine bruit was heard most distinctly over the anterior surface. The examination of the pelvis agreed with that already given. It appeared to be a shallow funnel, the greatest contraction being at the outlet.

Both the patient and her husband were urgent in their request that measures should be taken to save the patient from the danger of future pregnancy.

She was accordingly placed in preparation, and on July 16th, late in the afternoon, signs of approaching labor were manifest. I was telegraphed for, having gone out of town for the evening, and at eight o'clock the operation

was begun. I was ably assisted by Drs. Erck, Wells, and Gans. Incision, through the old cicatrix, exposed the uterus; the organ was then slightly tilted so that the right cornua could emerge, when the remainder was easily delivered. Dr. Wells now controlled the circulation by encircling the broad ligaments and cervix with the left hand. The uterus was then incised, the membranes ruptured, and the child delivered by the breech, which was found in the right iliac fossa. The cord twice encircled the child's neck, but it was not in the least asphyxiated, and began to cry almost before it was out of the uterus. The placenta was attached to the anterior wall, in the identical position which it occupied in the previous pregnancy, when the Cæsarean section was performed. By the time the child, placenta, and membranes were delivered the uterus was firmly contracted, and remained so during the hysterectomy, which was concluded by the technique just described. The patient withstood the operation without the slightest evidence of shock, and her recovery was as easy as after a normal labor. The child weighed about twelve pounds. She has nursed the child continuously since the operation. It is now seven months of age, and continues robust.

SUPRAVAGINAL HYSTERECTOMY FOR IMPOSSIBLE LABOR, WITH INTRAPELVIC TREATMENT OF THE STUMP.

By EDWARD P. DAVIS, A.M., M.D.,

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[Read February 5, 1896.]

II. Choice of the Operation.

Obstetric surgery is the natural outgrowth of the application of improvement in surgical methods and knowledge of antisepsis to obstetric practice. The result is seen in the saving of infant life and in the preservation, not only of the mother's life, but also of her health and vigor. Difficult extraction of the fœtus by the use of forceps, with mutilation of the mother and subsequent death of the child, may be avoided by the application to obstetrics of modern surgery. The term Cæsarean section has become indefinite because improved methods of operation in some instances supersede the simple and ancient procedure commonly known as Cæsarean section.

At the present day, in cases where natural birth is impossible by reason of disproportion in size between mother and child, the obstetrician has the choice of symphysiotomy, cœlio-hysterotomy, or cœlio-hysterectomy. In the last of these he must discriminate between cœlio-hysterectomy with the extrapelvic treatment of the stump, and cœlio-hysterectomy with the intrapelvic management of the stump.

The field of symphysiotomy, although undoubtedly a legiti-

mate one, is limited not only by the degree of disproportion between mother and child, but also by the size and development of the soft portions of the birth-canal. Experience has shown that symphysiotomy with extraction of the child through a small and ill-developed vagina is attended with greater risk than delivery by abdominal incision. Cases in which the fœtus is in breech presentation are again less favorable for symphysiotomy than are presentations of the vertex. When, however, the degree of disproportion is but moderate and the birth-canal is fully developed, symphysiotomy will save the lives of many children with a minimum risk to the mother.

In selecting delivery by abdominal incision, the operator must choose first between cœlio-hysterotomy and cœlio-hysterectomy. By the former we understand incision of the uterus and extraction of the child, with suture of the uterus, leaving the patient capable of further procreation. By cœlio-hysterectomy is described the removal of the greater portion of the womb, rendering further child-bearing impossible. In making this important choice, the wishes of the patient must be consulted. In women of good constitution and happily married, few will be found who will not desire to retain their power of reproduction. On the other hand, in married women of feeble strength, in circumstances of poverty, the burden of child-bearing may well be removed. In women illegitimately pregnant and belonging to the class of professional paupers who are likely to be with their progeny a constant burden on the State, the continuance of reproduction is certainly to be avoided. Most of the latter class have little conception of the responsibilities of maternity, and even if asked to make a choice are incapable of doing so intelligently.

Between cœlio-hysterectomy with intra- and extrapelvic treatment of the stump, the difference is great. Improvement in the technique of hysterectomy now enables us to remove the greater portion of the uterus with tubes and ovaries without excessive risk to the mother, and leaving her in a condition favorable for comfortable health. In view of these facts cœlio-hysterectomy with extrapelvic treatment of the stump is rarely

indicated. In cases where the patient's condition is such that rapidity of operating is of vital importance, it must be remembered that cœlio-hysterectomy with extrapelvic treatment of the stump is quickest. The simplicity of this procedure will also render it available for those who have had little experience in obstetric surgery. These advantages are more than counterbalanced by risks of infection owing to the position of the stump, by imperfect control of hemorrhage in many cases, and by tardy convalescence with subsequent interference with the functions of the bladder by the remnant of the uterus left behind. In cases where abdominal delivery is necessary and future pregnancy is to be avoided, cœlio-hysterectomy with intrapelvic treatment of the stump is at present the most desirable form of operation. To illustrate the propositions advanced the following cases are cited.

Case I. Reported in full before the Academy of Medicine, New York, Section on Obstetrics, April 25, 1895.—The patient is a young colored woman, small and ill-developed, whose height is four feet eight inches, and whose pelvic measurements are as follows:

Iliac spines	23 cm.
" crests	24 "
External conjugate	17 "
True "	$7\frac{3}{4}$ "
Right diagonal	21 "
Left "	20 "
Trochanters	29 "

As disproportion between the head and the pelvis evidently existed, labor was induced. After the patient had been in labor twenty-seven hours under good care in the Maternity Pavilion of the Philadelphia Hospital, it was determined to deliver her by abdominal section, because the head had entirely failed to enter the brim of the pelvis. The small size and ill-developed condition of her birth-canal rendered the indications for symphysiotomy not of the most favorable. The patient was without friends, with a family history of tubercular infection, and it was accordingly decided, in view of her illegitimate pregnancy, to make subsequent impregnation impossible. Cœlio-hysterectomy was accordingly performed, the stump being ligated and dropped. With the exception of rapid pulse during the first week of the puerperal period, the mother's recovery was uneventful. The patient nursed her own

child, and assisted in nourishing another. She is at present (ten months after the operation) in good health and still nursing her infant.

Case II.—M. H., aged twenty-three years, was sent to the Jefferson Maternity, May 8, 1895, by Dr. Jennings, of Merchantville, N. J., who measured her, and informed her that her labor would very probably require an operation. Her family history was that of tuberculosis and heart disease. With the exception of rheumatism, the patient's health had been good. She had a miscarriage at seven months. She was in labor at this time for three days, and was finally delivered, the child dying soon afterward. She was then informed that further pregnancies would be exceedingly dangerous. Upon admission the patient was fairly nourished. An examination of her urine showed that her excretions were fairly well performed. The head of the fœtus was found freely movable above the brim of the pelvis, the back was to the right, the limbs toward the left and front. The fœtal heart-sounds and position of the fœtus indicated a second position, the occiput pointing posteriorly. The pelvic measurements were:

Iliac spines	23½ cm.
" crests	26 "
Right diagonal	20 "
Left "	20.5 "
Trochanters	30 "
External conjugate	17 "
Vaginal measurement of the internal conjugate given	10 "

The patient had completed nine months' gestation and was within a few days of term. In view of the evident disproportion between mother and child it was thought best to induce labor with the hope that the patient could be delivered by forceps. Bougies were employed under antiseptic precautions, and severe labor pains with slow dilatation followed. When dilatation became complete the pains were very strong. The head, however, failed entirely to enter the pelvic brim. The resident physician, Dr. L. F. Hess, wisely refrained from rupturing the membranes, and to his good judgment is largely owing the life of the child. In view of the failure of induced labor to bring the head of the child into the brim of the pelvis, I decided to deliver the patient by abdominal section. She was accordingly etherized, the abdomen opened, the uterus incised, and the child and placenta rapidly delivered. The hemorrhage was controlled by the hands of my assistant, Dr. Coles. The child was slightly asphyxiated, but was readily resuscitated by Dr. Wells. The patient was then placed in the Trendelenburg posture. A hysterectomy clamp was applied across the uterus at the lower end of the incision into the womb, and the ovarian and uterine arteries and the broad ligaments were ligated at leisure. The uterus was then resected at the junction of the upper and lower uterine segments. The stump was closed by bringing together the peritoneal flaps and including the subperitoneal tissue

with continuous silk sutures. The pelvis was sponged clean, the stump dropped, and the abdomen closed without drainage. The patient's convalescence was uninterrupted. Her temperature was but on one occasion above 100°, and then for a short time at 100.5°. Lactation was performed and the child properly nourished. At the present time the mother is in good health. The stump of the uterus is freely movable and she is still nursing her child. Examination of the fœtus showed the presence of a rhachitic skull, whose diameters were as follows:

Maximum	14 5 cm.
Occipito-frontal	14 "
" -mental	13.5 "
Sub-occipital bregmatic	12 "
Bitemporal	8.5 "
Bimastoid	9 "
Biparietal	10¼ "
Trachelo-bregmatic	12 "
Circumference occipito-frontal	33 "
" maximum	34 "
Bisacromial measurement of trunk	13 "
Length	47 "
Weight	4 lbs. 14 oz.

The child has progressed favorably, having gained in weight, and when recently examined mother and child were in good condition.

Case III.—The patient, a colored girl, aged about twenty years, applied to the Polyclinic Hospital for attendance in confinement during November, 1895. Her pelvic measurements are as follows:

Anterior superior spines	25 cm.
Crests	26 "
Trochanter	29 "
Right oblique diameter	21 "
Left " "	22 "
External conjugate	17 " plus.

She had then completed the eighth month of gestation, the fœtus being in the usual position, the vertex presenting. Fœtal heart-sounds were heard upon the left side of the abdomen, but less distinctly than normal, although fœtal movements were vigorous.

Upon examining the patient's urine it was found that she was excreting imperfectly, and that she was threatened with toxæmia. She was accordingly given appropriate treatment for this condition. Two weeks after her first coming to the hospital she was taken apparently with labor pains; examination, however, revealed the fact that the fœtus did not engage, that the membranes were unruptured, and that her pains were not of a violent

nature. She was found to be constipated, and was accordingly treated by purgatives and sedatives, when her pains ceased. As she was not under intelligent care at home, she was admitted to the Polyclinic Hospital, that an intelligent study of her case might be made. On admission, it was found impossible to bring the head of the fœtus to engage in the pelvis. For this reason labor was not induced, as the disproportion between the head and the pelvis was so great that the induction of labor was not considered justifiable. The patient was given a warm bath daily, the action of the bowels was attended to, and she was kept under observation. She began to have labor pains on December 15th, although they were not strong, nor did they increase in frequency or strength. As the head entirely failed to engage, dilatation was very slight, and the membranes pressed but very little against the mouth of the womb. It was evident on December 16th that spontaneous labor would not proceed, and that the patient must be delivered by some operative procedure. The vulva and vagina were small and ill-developed, and in view of the small size of the pelvis and of the birth-canal, symphysiotomy was declined. It was ascertained that the patient had been leading an irregular life, and that she was without known friends. In view of all the circumstances in the case, it was thought best to deliver her by cœlio-hysterectomy. On December 17th, after suitable antiseptic preparation, with the assistance of Dr. Wells, Dr. Coles, and the resident staff, the patient was placed in the Trendelenburg posture, the bladder emptied by catheter, and the abdomen incised. The abdominal wall was very thin, and the sharp scalpel employed not only opened the abdomen but also made a small incision in the peritoneal coat of the uterus. This was followed by free bleeding, which necessitated the rapid completion of the abdominal incision, the turning out of the uterus, and the prompt delivery of the child. Upon opening the uterus the placenta was found directly beneath the line of incision, and it was observed that the first incision into the uterus, made when the abdomen was opened, had opened a sinus directly over the placenta; this explained the bleeding, which, however, lasted but for a moment. The child was readily extracted, cried vigorously, and breathed naturally. The time occupied in opening the abdomen and extracting the child was two and one-quarter minutes. The uterus was then clamped by hysterectomy-forceps, the ovarian and uterine arteries ligated, and the uterus amputated at the juncture of the lower uterine segment with the upper contractile portion of the womb. The stump was closed by continuous silk sutures, and the peritoneal edges brought into approximation. There was no hemorrhage, and drainage was not employed. The peritoneum and fascia were then closed by a continuous fine-silk suture, and the muscular wall of the abdomen brought together by silkworm-gut. An antiseptic dressing was applied and kept in place by long strips of adhesive plaster and a flannel binder.

The after-history of the case was uneventful. The patient's highest temperature was 101° for a short time, her average temperature ranging from

99° to 100°. She nurses her child, which has grown naturally. The first dressing was removed sixteen days after the operation, when the stitches were taken out. It was found that the deeper tissues had closed by first intention, and that a few points in the edges of the skin were not in accurate approximation and were closing by granulation. Examination of the child showed it to be at full term, its head well ossified, and slightly larger than the normal skull. It is a male, and has increased in weight in the normal manner. The mother's supply of milk continues abundant.

The after-treatment of these cases, with the mode of dressing employed, is of importance. As the abdomen is closed without drainage, the operator does not expect to interfere with the wound until union has rendered the stitches unnecessary. But one dressing is needed for two weeks after the operation, and that should be the one first employed. After the sutures have been inserted the line of incision should be freely powdered with iodoform or with boric acid and iodoform, and a thick dressing of antiseptic gauze and cotton placed upon the abdomen. This dressing should be kept in place by strips of adhesive plaster extending entirely over the dressing and upon the patient's thighs and sides. It is better in these patients to dispense with the tapes often employed, which are usually tied over the line of incision. As the incision is a long one, reaching above the umbilicus, it is essential that the patient's abdomen be kept as quiet as possible; hence the value of the adhesive strips which are not readily displaced. Over these strips an ordinary many-tailed bandage of flannel may be applied. In view of the length of the incision, it is well to leave the sutures in place as long as possible. They may remain to advantage for two weeks, at the end of which time the first dressing is made, and the sutures are removed. The general care of the patient is that of any puerperal case. The intestines should be emptied within forty-eight hours after the operation, preferably by small doses of calomel, followed by rectal injection of salts and glycerin, or castor oil and turpentine. In other respects the patient's care should be that of the normal lying-in woman. She should remain upon her back for three weeks before attempting to sit up, and should not stand or

walk for four weeks at least after the operation. An abdominal bandage will often be a source of comfort to the patient, although, if union has been good, it is not a necessity.

I desire to call attention to the early history of Mrs. E. H., a patient operated upon at my request by my colleague, Dr. Baer. She has a funnel-shaped and flattened pelvis, whose diameters are as follows:

Anterior superior spines	28 cm.
Crests	30 "
Trochanters	29½ "
External conjugate	19½ "

Palpation of the inner surface of the pelvis reveals marked narrowing toward the outlet. In comparison with the breadth of the patient's shoulders and the width of the iliac bones, it is also found that she has a flattened pelvis. She has been pregnant seven times, her first, third, fourth, and fifth labors being terminated by the use of the forceps, with the birth of a dead child. All of these children weighed more than twelve pounds, the first thirteen and one-half. Her second labor terminated spontaneously, a small male child being born, although her medical attendant had sent for assistance to perform an instrumental delivery. This patient came under my observation in January, 1894, desiring the delivery of a living child. Her fœtus was in breech presentation, and evidently a large one. She was delivered by me at the Polyclinic by cœlio-hysterotomy, Dr. Baer being present in consultation. The uterus was sutured and the abdomen closed without drainage. She made an excellent recovery. Her child weighed eleven and three-quarter pounds, and was 52 cm. long; it is living and in excellent health. As the patient is a respectable married woman, her husband living, and as she expressed no wish to avoid further conception, I performed cœlio-hysterotomy as described. Early in 1895 she wrote me that she was pregnant again, and feared greatly the result of her pregnancy. I at once informed her that she could be delivered of a living child, probably without a serious operation, by coming to me in time for the induction of labor. She came to my office

early in her pregnancy, and was evidently in excellent condition. Her pregnancy was uneventful; she suffered some abdominal pain during the early months, which seemed to be due to possible adhesions between the uterus and peritoneum. This disappeared, however, and she remained in good health. She presented herself at the Jefferson Maternity near the end of her gestation, long after the period assigned for the induction of labor. In my absence from the city I requested Dr. Baer to kindly take care of the patient. It was her expressed desire that this pregnancy should be her last. This case illustrates, I think, the choice of operation, and the fact that with patients who are not always obedient to the physician's instructions it will not do to depend upon the induction of labor unless the patient co-operates loyally with the desires of the physician. When asked why she did not return for the induction of labor, she gave her fear of that method of delivery as the reason.

In conclusion, stress must be laid upon the great difficulty which the conscientious obstetrician will experience in choosing the form of delivery most likely to preserve the lives of mother and child. So remarkable are spontaneous births in abnormal cases that the physician must always give nature a chance to accomplish delivery. His attitude, however, must be that of one who delays watchfully and intelligently, and not with neglect. As stated in Cases I. and II., the induction of labor under antiseptic precautions should first be practised when full viability has been attained. In many cases spontaneous birth follows, or at most version or forceps will complete the labor. When, however, it is clearly evident that the fœtus cannot pass through the birth-canal without such injury to mother and child as will jeopardize the lives and health of both, it is the part of wisdom to choose that form of surgical delivery most suited to the condition and development of the mother. When the child cannot enter the birth-canal the use of forceps is certainly contraindicated, and delivery must be accomplished by symphysiotomy or abdominal incision.

DISCUSSION.

Dr. E. E. Montgomery: I have listened with much pleasure to these two interesting papers on the subject of the treatment of patients who are unable to deliver themselves, and in whom delivery through the normal passage is impossible. With regard to the choice of operation, it must depend somewhat upon the condition of the patient when she presents herself to the obstetrician. Thus, in a patient who has been in labor for two or three days, and there have been repeated attempts at delivery, causing contusion of the parts, and the patient is exhausted, hysterectomy is the only operation which affords the patient a chance of recovery. In such cases, cœlio-hysterectomy is an operation of great danger on account of the septic changes which are likely to occur in the injured uterus. In every case we must be guided by circumstances in the choice of operation. Most operators, on account of the fact that the operation must be repeated with every subsequent pregnancy, prefer to discard Cæsarean section for cœlio-hysterectomy; but I do not think that an operator is justifiable in performing hysterectomy without first obtaining the consent of the patient, even where the children are, on account of poverty, likely to be a charge upon society; because even the poorest have a right to their own organs.

The technique proposed by these gentlemen is subject to very little criticism. It would seem, however, that instead of having an assistant to hold the neck of the uterus and prevent hemorrhage, it would be better to encircle the neck with a rubber tube, draw it tight and secure it with the forceps; the rubber tube is preferable to the assistant's hands as being less liable to cause infection. As to the question of leaving a part of the stump, I should say that if a portion of the neck is to be left, the plan proposed is undoubtedly preferable to other methods; but it seems to me better, as a rule, to remove the uterus flush with the vagina. The uterus is obliged to undergo sub-involution, and the neck will also be liable to undergo changes and is liable to cause hemorrhage. By getting rid of the stump we obviate these dangers. It is true that we may also obviate these by modern methods for dealing with hemorreage, but it is at the expense of more ligatures and considerable time.

Dr. Charles B. Penrose: I have but very little to say in regard to the subject or in discussion of these papers, because I have never had an opportunity of performing hysterectomy for the condition described by Dr. Baer and Dr. Davis. The point which interested me most in the paper was the doing away with the extra-pelvic treatment of the stump and the doing away with the nœud. All good operators in this country and in Europe have given this up; but it is still adhered to by some surgeons. Only last week I read the report of a case in which it was used. The treatment of the stump

by the intra-pelvic method is very simple during pregnancy, on account of the lax condition of the tissues.

Dr. J. M. Baldy: Considering the choice of operation for women in this condition of affairs, I would say that symphysiotomy has a very narrow field. A woman who cannot bring forth a living child without a Cæsarean operation should not be forced to go through another pregnancy. Of course there are cases in which a woman would be willing to undergo anything; but under ordinary circumstances the woman should not be rendered liable to the risk. As regards the symphysiotomy, I believe it is a more serious operation than any of the operations proposed for opening the abdomen and removing the child. It is a serious thing for the woman; if the bones do not unite after the operation she is in a serious condition. Moreover, a woman who is a proper subject for a symphysiotomy is also a proper subject for premature labor, and a premature labor should always be performed by preference. It is understood that, as in the case mentioned by Dr. Davis, these women do not always report in time for the premature labor, but when they do it should always be the operation of choice.

Where the question arises as to unsexing a woman, we enter upon a different field from medicine. I am in favor, personally, of reducing the tendency to crime by stamping out of individuals and the prevention of propagation of the unfit; but, dealing with these patients as surgeons and physicians, we must treat them as in all other cases, and leave with them the choice of saying whether they will or will not submit to the operation.

Dr. E. P. Davis: Replying to the remark made by Dr. Montgomery to the effect that in the pregnant woman it would be a simpler operation to remove the entire uterus, and a safer method on account of the changes which the cervix must undergo, possibly Dr. Montgomery did not bear in mind that the whole genital tract undergoes involution, and that ligatures can be placed more safely in the tissues of the broad ligament, than through the vagina, to control hemorrhage.

I am fully in accord with Dr. Baldy in his opinion on symphysiotomy. There is no comparison between the comfort of abdominal delivery over symphysiotomy; but I think that there are circumstances in which symphysiotomy is the operation to be performed, even at the risk of more discomfort, and in some cases risk of septic infection.

As to the question of technique: The ordinary practitioner cannot be expected to do the operation with the nicety and skill that Dr. Baer uses. The operation as described by me is much simpler: applying a clamp across the uterus, which does away with the hands of assistants during the hysterectomy. The stump is divided at a higher level than in Dr. Baer's operation, and the stump is brought together with very free stitching, making a larger stump than Dr. Baer does. I mention this because the ordinary surgeon cannot perform these operations with the skill of a specialist, and for such operators I consider my method more suitable.

INTRACRANIAL TUMORS.

THE EYE-SYMPTOMS OF INTRACRANIAL TUMORS.

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[Read at special meeting February 19, 1896.]

It has been known in a vague way since the earliest periods from which any medical records have survived that the integrity of the visual functions was menaced by intracranial disease, and that blindness often resulted from it; but it is only since our advancing knowledge of normal and pathological anatomy has given us a better acquaintance with the course of the cerebral nerves and of the location of their mid-brain and cortical centres that we have had any very distinct ideas in this matter, and that we have been able to utilize them in the recognition and location of intracranial tumors. The interest in this subject has been much heightened since the introduction of the ophthalmoscope has enabled us, with the aid of the cornea and of the lens as magnifying glasses, to study the changes which take place in the distal end of a living cerebral nerve.

Since von Graefe, in 1854, first called attention to the altered appearances of the intraocular ends of the optic nerves, which may be seen in most cases of inflammation of basal meninges and of intracranial tumors, the study of these changes, their diagnostic significance, and mode of causation has been the subject of constant discussion and fruitful investigation at the hands of numerous clinicians and pathologists.

It is, however, not alone to the nerve of sight that we must turn for information as to the eye-symptoms of intracranial growths. The eye and its appendages being supplied by five other cranial nerves, three of which are devoted exclusively to these organs, we may expect pressure on, or degeneration of, any part of their trunks, or of their mid-brain or cortical centres to produce interference with their functions and noticeable symptoms of disturbance. Thus, double vision due to impaired action of the straight or oblique muscles, paresis of the pupillary or ciliary muscles, loss of power in the levator or in the orbicularis, are all of frequent occurrence, and aid us in diagnosticating and localizing an intracranial growth.

Papillitis. Inflammatory changes are present in the intra-ocular ends of the optic nerves at some stage of the affection in about 90 per cent. of the cases of intracranial growth and of basilar meningitis. There is increased redness of the disk with serous effusion between the nerve-fibres and undue fulness and tortuosity of the retinal veins. The normal boundaries of the disk are at first veiled by the hazy retinal fibres, but soon entirely hidden by their increasing swelling and opacity. The disk becomes prominent and projects as a small irregularly rounded mass into the cavity of the eyeball. This prominence is usually highest at the nasal side, where the nerve-fibre layer is normally at its thickest. The capillaries and veinlets on the surface of the swollen disk become so distended that they are readily visible by examination in the upright image, while the swollen and hazy nerve-fibres often hide from view a considerable stretch of the veins and arteries soon after their emergence from the disk, which reappear once more further in the periphery of the retina, where the fibre-layer is normally thinner and still retains its transparency. After a varying period in which these appearances of vascular turgidity remain unchanged, the lymph effused into the head of the nerve becomes opaque and commences to contract, so that the smaller vessels are constricted and hidden from view. Later still, the swollen papilla begins to shrink, and, if the patient survives, after a period of some months slowly regains the

retinal level, so changed and contracted, however, that the conducting power of the nerve-fibres is usually entirely abolished, the capillary vessels shrunken, and we have a whitish, opaque, and atrophic disk.

The Vision often Nearly Normal in the Early Stages. In the early stages of the swelling of the disk there is often wonderfully little interference with the acuity of vision, and in a strong light we frequently find normal acuity in a papillitis which has become quite marked. In fact, it is only after the swelling has existed for some time, and has reached a high grade, that we have marked diminution of the visual acuity and increase in the size of the blind spot, with contraction of the color and form fields, symptoms which are the rule when from long-continued pressure and from the contraction of the exudation the swollen disk commences to shrink. Owing to this circumstance, the early symptoms of intracranial growths and accompanying papillitis are at times overlooked. I well remember the case of a gentleman who had been indisposed for some time, but was not thought to have any serious sickness, who came to me complaining of headache and saying that his vision became blurred after looking at any object intently, symptoms such as are frequently found in cases of slight hypermetropia with impaired health. I knew that his vision had previously been perfect and his eyes nearly emmetropic. There was now a slight falling off in his visual perceptions, and the acuity, which had previously been 6/VI or better, was now 6/VII, and as I gradually pulled down the window-shade and darkened the room, I found that his vision diminished in the feeble light in a ratio very much greater than did my own. The ophthalmoscope showed incipient choking of the disks, with a prominence at the summit of about 2 D.

The undue diminution of central and peripheral acuity of vision with diminished light is a symptom either of interference with the function of the retinal epithelium, as in the early stages of pigmentary degeneration of the retina, or of interference with the conducting power of the nerve-fibres from swelling or from contraction, as in cases of neuritis with

consecutive atrophy. Mere feebleness of the general health does not, if any existent optical defects are corrected by proper glasses, cause diminution of the acuity of vision, although it produces rapid fatigue and blurring, often with annoying after-images. It is also noteworthy that patients with papillitis do not usually complain of phosphenes.

The termination of choked disk is, as previously mentioned, usually in atrophy of the optic nerves, provided that the patient survives his intracranial trouble long enough. We see, however, occasionally in children a complete atrophy of the intra-ocular ends of the optic nerves as the sole ocular evidences of a previously existent tubercular meningitis, and also cases of syphilitic disease of the brain and its membranes, where the patient after prolonged use of alteratives retains a moderate amount of vision, often sufficient to enable him to read comfortably and to do ordinary work. In the last-mentioned cases the intra-ocular ends of the optic nerves by their blue-gray discoloration and by hazy edges still give evidence of a previous papillitis.

The Stage of Intracranial Disease at which Papillitis Occurs. While I believe that papillitis occurs in about 90 per cent. of the cases of intracranial growth at some stage of the disease, it is by no means always an early symptom, but often develops only when the case approaches its termination. Large intracranial growths may long be without it, while small ones may rapidly produce it. Just so long as the growth of the neoplasm is slow and the absorption of surrounding tissue proceeds *pari passu* with the development of the tumor, we usually have no choked disk; but any vascular storm arising either from rapid growth and congestion, or from such a location of the tumor as causes compression of some of the sinuses of the dura mater, will usually produce it. Rapid development of papillitis is especially apt to occur when the lateral, the jugular, or the superficial petrosal sinuses are pushed against the bony walls of the skull, and thus cause swelling of these venous channels with partial stasis of the circulation and leakage of serum into the subdural and subarachnoid spaces.

The Ordinary Appearances of Papillitis Contrasted with the Swelling Produced by Pressure on the Optic Nerves Close to the Optic Foramen. While papillitis more or less characteristic in appearance is one of the most common symptoms of intracranial tumor in most parts of the cranial cavity, in some few cases where the tumor is located near the sella Turcica and growing along the wings of the sphenoid bone compresses each optic nerve close to its exit into the orbit, we may have quite a different ophthalmoscopic picture.

Here we find pallid, although moderately swollen, disks with intense gray haze on their surface and on the adjacent retinal fibre layer, with complete absence of the development of the veinules and capillaries, usually so characteristic of papillitis. Such growths, from their location, at times also press on the olfactory nerve and on the ethmoidal and sphenoidal sinuses, and give rise to the most unpleasant sensations of disagreeable odors and to annoying dryness of the nose and fauces.

Recurrent papillitis does not occur after complete atrophy of the disks, but as long ago as 1879 Gowers recorded cases occurring in incomplete atrophy with partial subsidence of the swelling. Of late years the great increase in the practice of trephining the skull for brain-lesions has furnished a considerable number of cases where the symptoms of swelling and engorgement of the disk have notably diminished after trephining, even when the tumor has not been removed.

In some such cases, as well in some in which the tumor has been removed, there is a temporary diminution of the choking of the disk followed by a recurrence and increase of the papillitis when the tumor has repullulated or the wound has closed. I have only seen one such case in a patient under the care of my colleague, Dr. J. William White, with a tumor near the arm centre of the right hemisphere of the brain, which was subsequently reported in full by Dr. A. C. Wood.[1] In this instance after partial subsidence of the papillitis there was a marked increase of the swelling of the disk after the healing of the wound and the repullulation of the tumor.

[1] University Medical Magazine, January, 1895.

Pathology of Papillitis. It was at one time supposed that papillitis might be produced by augmented intracranial pressure on the cerebral sinuses causing congestion and intravenous tension in the ophthalmic veins and through them in the head of the optic nerves, but the extremely free anastomosis which has been shown to exist between the orbital and facial veins renders this mode of origin improbable.

Palsy of the sympathetic filaments which are given off from the carotid plexus has also been supposed to be a cause of papillitis, but the fact that intracranial tumors in the most diverse positions may give rise to it, and that the congestion is limited to the head of the nerve, while the branches going to the pupils and the eyelids are unaffected, speaks strongly against this view.

On the other hand, the frequent occurrence of subdural and subarachnoid effusion, with distention of the ventricles with serum, the pyriform dilatation of the dural sheath of the optic nerve just behind the eyeball, and the occasional demonstration of tumor-elements and detritus in the tissue of the lamina cribrosa and of the head of the optic nerve have inclined most investigators to the view that papillitis is a local inflammation of the intraocular ends of the optic nerves, caused by infiltration of the head of the nerve with infected serum. This fluid passes down between the pial and dural sheaths of the nerves, carrying with it ptomaïnes, bacilli, and tumor-elements, which, owing to neoplastic or to degenerative processes in the intracranial growth and its vicinity, have found their way into the subdural and subarachnoid spaces; and which, accumulating at the distal ends of these lymph channels, cause an infectious and symptomatic inflammation.

The accumulation of serum, probably infected, in the tissue of the head of the nerve and around it has been demonstrated in many autopsies, but the infectious nature of the infiltration is, I believe, only positively proved in those cases in which tubercle-elements and bacilli have been found in the intraocular end of the nerve.

Symmetrical Defects in the Fields of Vision and Homonymous Lateral Hemianopia. The disturbances in the circulation and nutrition of the intraocular ends of the optic nerves are by no means the only valuable symptoms of intracranial growths which the affections of the second pair present to us. The various forms of symmetrical defects of the visual fields are worthy of careful study as presenting evidence, and in many instances localizing evidence, of an intracranial growth.

Owing to the partial crossing of the fibres at the chiasm of the optic nerves the right side of each retina is supplied with fibres from the right optic tract and from the right visual centre, while the left half of each retina is supplied from the left optic tract and from the left visual centre. Any intracranial growth which impairs the action of the right tract or right visual centre causes diminished acuity of vision or blindness in the right half of each retina and in the corresponding left half of the visual field, while the reverse is the case in affections of the left tract or left visual centre which cause impaired or abolished vision in the left half of each retina and in the right half of the field of vision. It by no means follows, however, that all fibres of the tract or all portions of the sight centre must be involved at once, and where only part of them is affected we have defects which do not extend over the entire half of the field of vision, but which are characterized by being absolutely symmetrical on the two sides, producing, for example, a loss of the upper inner field of one eye with a corresponding defect in the upper outer field of the fellow-eye. I have seen such visual defects, combined with very moderate and occasional headache, remain for several weeks the only symptoms of a tumor of the temporal lobe, followed later by convulsive seizures and partial hemiplegia. In this case, however, an interval of five months existed between the first appearance of the symmetrical defect in the fields of vision and the appearance of choked disk. Tumors so situated as to press on the optic nerves in front of the chiasm may give rise to more irregular defects in the fields of vision, but where the inner strands of each nerve are pressed on, we have loss of the

temporal half of the field of vision in each eye. Pressure on the lower surface of the chiasm will produce loss of the upper halves of the fields of vision, while pressure on the upper surface might cause loss of the lower halves of the fields. So also symmetrical pressure on the outer borders of the chiasm might produce blindness of the temporal halves of each retina and loss of the binocular fields of vision.

Wernicke's Symptom. As is well known, the pupil contracts when strong light is thrown on it, by reason of a reflex impulse, transmitted from the second to the third pair of nerves in the vicinity of the quadrigeminal bodies. If now we throw a minute point of light on the blind half of the retina in a case of homonymous lateral hemianopia, we may or may not excite pupillary contraction. If the lesion of the optic fibres lies in the sight centre or in the strands running from it to the posterior eminences of the quadrigeminal bodies, the pupil will contract; while if the lesion is in advance of this point, we excite no pupillary reflex. This action, therefore, may become an important localizing symptom. In total blindness due to pressure on or disease of the optic nerves in front of the chiasm, of course, there is no pupillary reflex; while in the same condition from double lesions of the sight centres we have both reflex arcs intact and prompt pupillary reaction. Where the lesion is double, one situated in the sight centre of one side, and another on the strands of the optic nerves in advance of the quadrigeminal bodies on the other side, we may have absolute blindness with hemianopic pupillary reaction, because the reflex arc on the side of the cortical lesion is intact and is sufficient to produce pupillary contraction when light is thrown on the corresponding part of the retina.

Subjective Sensations. Curious subjective sensations of light are at times met with in intracranial growths where the pressure is sufficient to stimulate some part of the intracranial visual apparatus without seriously impairing its functions.

Pressure on the Nerves at the Base of the Skull; Disease of the Cortex Cerebri. Symptoms due to pressure on the third, fourth, fifth, and sixth nerves in their course at the base of the skull

are so frequent and so familiar that it is not necessary to review them in detail from an ophthalmological standpoint. On the other hand, eye lesions due to tumors of degenerative areas in or near the cortical centres of these nerves are rare and have not happened to have come within the range of my own clinical experience, and I will not therefore tax the patience of the College by recapitulating a bibliography of cases not my own. I will only refer to the compilations of such reports published by Nothnagel, by Exner, by Knies, and to similar ones since made known by other laborers in this field.

THE SURGICAL TREATMENT OF INTRACRANIAL TUMORS.

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Diagnosis. The chief difficulty in the surgical treatment of intracranial tumors is unquestionably the lack as yet of means of making an absolutely exact diagnosis of the location, size, nature, and number of such tumors. This has already been considered by other speakers in this debate, and I simply mention it in passing to emphasize the need. That minute, repeated, and exact experimentation upon animals as well as accurate clinical observation are both necessary to achieve this result is self-evident. No surgeon should attack a brain tumor until he has not only exhausted his own knowledge, but has also called to his help the ophthalmologist and the neurologist, whose observations are indispensable to a correct diagnosis.

Possibly the recent discovery of Röntgen may assist us. By this he has achieved what has heretofore been regarded as impossible—namely, by means of the cathodic rays from Crookes's tubes of skiagraphing[1] internal parts of the body. Whether intracranial tumors will be also as permeable to these rays as are other soft parts of the body we do not yet know. If they are, it is possible that we may obtain very little additional information. It is, however, within not only the range of possibility, but it would seem to be of probability, that modifications of the method may be discovered by which we may be able to

[1] This term proposed by Dr. H. W. Cattell is the proper Greek form of the mongrel word, shadowgraph, so often used by the newspapers.

make such tumors visible. Until this discovery is further developed and made actually available, we must rely on the existing methods of cerebral localization.

Opening the Skull. Possibly the proposition of Doyen may aid us very materially. This bold and able surgeon has recently proposed[1] to make an osteoplastic flap of the entire side of the skull ("temporary hemicraniotomy," as he terms it) by an extension of the well-known Wagner-Wolff method; the scalp forming a hinge on which the flap is turned over by fracturing the base of the bony flap. He has had also the courage of his convictions by operating already on four cases, of which two died and two recovered (one, a microcephalic, was greatly improved; the other, an epileptic, received only temporary benefit). In fact, he claims that "in future cerebral localization is useless in surgery and has only a physiological interest." Whether so extensive a temporary resection will stand the test of time and experience is somewhat doubtful, but, should it do so, it will greatly simplify the treatment of tumors.

The mode of access to the tumor, if Doyen's method is not followed, is either by the ordinary method of trephining, using not less than an inch-and-a-half trephine, and making either a single or multiple trephine-openings, which may be later connected by sawing or gnawing away the intervening bridges of bone, or by various methods for making the usual temporary osteoplastic resection.

Last summer, Mr. Horsley told me that he had returned to the use of an ordinary straight saw, cutting by means of this either three sides of a square and breaking the fourth, or sawing the fourth if the bone is to be removed entirely. Krause, instead of this, uses a circular saw (which is actuated by the surgical engine, like that which is used by the dentists), with this difference, that the handle of the saw is prolonged on the further side, so that the saw can be held firmly by *both* hands. Others use the chisel in one of two ways. If an osteoplastic resection is to be done, the margins of the flap are cut through

[1] Revue de Chirurgie, 1895, p. 689.

by such chisels as have been devised by Hartley, of New York, and by Pyle, of Canton, Ohio, or, secondly, by simply chiselling away all the bone over an area such as we wish to uncover. For this method Krause's gouge is the best. Another method is by such drills as those devised by Dr. Cryer, of this city, which are useful and effective, but require an expensive and not easily obtained extra heavy surgical engine. Whichever one of these processes is used requires a considerable amount of time, varying usually from fifteen to twenty-five minutes, and involves a moderate and sometimes a considerable loss of blood both from the scalp and the bone.

Operation in One or Two Stages. The skull being opened, we may follow one of two courses. First, especially if the tumor is small, we may proceed with its extirpation and the closure of the wound, or, secondly (and this is especially applicable to tumors of large size), the first part of the operation may be terminated so soon as the brain is exposed and the hemorrhage checked. The wound is then temporarily closed, and the remainder of the operation is completed after the lapse of from three to six days. In other words, the tumor is attacked either by an operation in a single stage or an operation in two stages, as may be thought best. In large tumors I should certainly advise that the operation should be divided into two stages. Hemorrhage and shock, the two principal dangers in connection with the removal of cerebral tumors, are thus minimized. It has, however, the disadvantage of a possible infection. Two operations double the danger of infection, which is always a real one even in the hands of the most skilful. Weighing the probabilities of the two methods, however, in any large tumor, I should be distinctly disposed to operate in two stages rather than one.

Hemorrhage. The control of hemorrhage is one of the difficult problems in connection with the removal of the cerebral tumors. The hemorrhage may arise either from the vessels of the dura, from the vessels and especially the veins of the brain itself, or, thirdly, from the sinuses. Hemorrhage from the diploë is so easily and effectively controlled by Horsley's anti-

septic wax that it may be dismissed at once. For hemorrhage from the vessels of the meninges, the ligature is an efficient means of control. If the dura be cut and an artery bleeds, the cut end can be tied just as that of any other vessel. If it be necessary to ligate the vessel in its continuity in a dura unopened, though with torn vessels, it can be secured by passing a fine silk thread by means of the finest semicircular Hagedorn needle under the dura and around the vessel, care being taken by lifting the dura not to wound the underlying cerebral veins themselves.

For venous hemorrhage, the best method, also, is the ligature. Rarely can the vessel be seized by the forceps and a ligature applied. The best method is again by the semicircular Hagedorn needle of suitable size, to pass a silk or catgut ligature through the cerebral tissue immediately below and around the vein, and then to tie the vessel by drawing with equal force on the two ends, not constricting the vessel with so much force in tying the knot as to tear through its weak walls. Sometimes packing and hot water (not over 110° F.) will aid greatly, especially in arresting any copious oozing. If the sinuses are torn or opened, the hæmostatic forceps may be used to grasp the opening, if it is small, or, as I have done in one case, by three pairs of hæmostatic forceps placed alongside of each other, the opening can be closed. The forceps may then be allowed to remain *in situ*, being enveloped, of course, by the dressing, and may be safely removed after three days. Should this method not be available, then the sinus should be plugged with iodoform gauze, the end of which protrudes through the scalp-wound, and can be safely removed again after three days. I have removed it even in twenty-four hours with success.

I would especially lay stress on the fact that any of the superficial sinuses of the brain may be exposed with almost perfect safety by gnawing away the bone over them after having separated the sinus gently from the skull by Horsley's dural separator or a probe. The point where the parietal veins enter the superior longitudinal sinus should be avoided, if

possible, as these are large vessels, and a great amount of blood may be quickly lost. Hemorrhage from the sinuses, however, can be controlled again by packing, if not by the hæmostatic forceps, or possibly by fine suture. In several cases I have thus exposed both the superior longitudinal and the lateral sinuses over a large part of their extent, and have opened the sigmoid portion of the lateral sinus on several occasions, and very easily controlled the hemorrhage by packing with a small strip of iodoform gauze.

In separating the dura from the brain, great care must be taken as we approach the superior longitudinal sinus. The veins of the brain widen into venous bays (the parasinoidal spaces), from which the hemorrhage will be often more profuse and alarming than from the sinus itself. One case I lost distinctly from the profuse hemorrhage from such a parasinoidal space, as I was not able quickly enough to control the bleeding by packing. The loss of blood from the cerebral veins is certainly more dangerous than the loss of an identical amount from other veins of the general system. It seems to drain the brain of blood so suddenly, and to make such an intense impression on the important nervous centres in the brain and cord as to be incompatible with life. Hence, when the finger gently introduced under the dura in the neighborhood of the superior longitudinal sinus perceives any attachment of the dura to the brain, we should be most careful to desist from any further separation of the parts, lest by doing so these large veins be torn and a parasinoidal space opened. On no consideration should this be done until the bone has been first widely gnawed away over the point of the adhesion, to give ample room instantly to deal with possible hemorrhage.

Not uncommonly we can avoid a great deal of hemorrhage from the cerebral tissue by lifting the pia from the underlying convolutions so as to avoid the veins by working under them. The pia can be drawn out of the deep sulci in this manner with relative ease. Great care must, of course, be used in manipulations under such a displaced pia.

Removal of the Tumor. The tumor, when discovered, may be removed either by the finger if it be well encapsulated, or if not, then by the knife, which should be held perpendicular to the surface so as to injure the adjacent cortex as little as possible. At the same time we must remember, especially in cases of sarcoma or its allies, that the infiltration of the cerebral tissue extends some distance beyond the tumor proper. Therefore, some of the apparently healthy brain-tissue must be sacrificed for the purpose of safety. This may induce paralysis of important centres, but no such calamity can compare with the certainty of a return, and, therefore, of a future fatal issue by a less thorough removal. Not uncommonly the scoop or curette may answer for the purpose of removing any remaining portions of the tumor after the main part has been removed.

Even in cases in which the tumor is too large to be removed with safety, a partial removal often gives very great relief, especially to the intolerable headache and other similar distressing symptoms, and this partial removal may be attempted not only once, but, as I have done it in one case, three times, and each time with great relief.

Should it be impossible to remove any of the tumor, the mere removal of the bone over the tumor will often give very great relief. The most remarkable case that I know of is one of Mr. Horsley's, in which, having experienced the comfort which followed the removal of half of the occipital bone, the patient later returned and begged him to remove the other half of the occiput, a wish which he gratified with a happy result.

Sometimes the dura is involved in the tumor, and must therefore be sacrificed. The danger of fungus cerebri is relatively small when the dura is closed after being opened, and specially if the brain-substance itself has not been interfered with. In such cases, as I suggested a few years ago, the dura may be replaced by a bit of the pericranium. A piece of this, a little larger than is sufficient to make good the lost piece of dura, is cut entirely loose from the under surface of the flap of scalp and is sewed in place by a few interrupted sutures.

In doing so, while I am not sure that it is needful (for I have not had the opportunity of making a post-mortem in any such case), I have always, on theoretical grounds, however, turned the pericranium upside-down, so that the osteogenetic surface should be external. If, then, any bone is developed from this osteogenetic surface, it grows away from the brain instead of into it. Such a closure of the dura is the most efficient means that I know of for the prevention of fungus cerebri, and thus avoids one of the most serious dangers which may follow such an operation. I have thus utilized the pericranium in two cases with success.

Drainage. Excepting cases of abscess, gunshot-wounds, intracranial hemorrhage, and cysts, it is my rule at present not to drain. Occasionally, on account of hemorrhage, it will be necessary to leave some iodoform gauze protruding from the wound, and this acts as a drain. In such cases, however, I always insert a stitch in the scalp at the time of operation, so that as soon as the gauze is removed the wound may be entirely closed, or, should there be need for drainage for twenty-four or forty-eight hours after removal of gauze, I insert a small bit of gauze to keep open only the skin-wound, and the stitch is tied as soon as the needle is passed. If no drain be employed, very frequently by the second or third day the flap will bulge considerably by reason of the accumulation of wound-fluids under the scalp. If this is the case, and all the more if it is attended with headache or other pressure-symptoms, I either insert a pair of forceps between two of the sutures, and thus give exit to the wound fluids, or sometimes cut a stitch for the purpose of gaining sufficient room for the evacuation of the fluid. The avoidance of a drain is not only important in securing a much earlier union of the edges of the wound, but also removes an occasional but very real danger of later infection.

. *Closure of the Opening in the Skull.* A month or more after the patient has entirely recovered from the operation, the question of closing the opening in the skull will naturally arise. Until this closure is effected (and sometimes it is best never to

close it) I always direct the patient to wear a skull-cap, on the inside of which is sewn a bit of tin a little larger than the opening, the sewing being made possible by first covering the tin with some silk.

Sometimes the opening in the skull can be closed immediately by replacing the bone in one of two ways. Macewen first cut the piece of bone removed into a large number of small pieces, which he sprinkled over the opening. I think it much better, however, if it is intended to replace the bone at the primary operation, to replace it in bulk. I have now in about fifteen cases replaced a button of bone an inch and a half in diameter and the entire thickness of the skull, and in not a single case has the button lost its vitality. If this is to be done, however, the button of bone must be very carefully kept warm and moist, by placing it in a cup in a 1 : 2000 bichloride or some similar solution and placing this cup in a basin of water with a thermometer, so that the water shall be kept from 105° to 100° F.

The Later Closure of such an Opening. For this König has adopted a very ingenious method. At any late time after the opening has been made, by accident or by a surgical operation, he has dissected away the scar over the opening, and has then outlined an adjacent flap of the shape and somewhat larger in size than the original opening, to permit of shrinkage. The flap is not separated from the skull, but under it he chiselled away the outer table in fragments, these fragments being left adherent to the under surface of the flap. By sliding the flap into place so as to cover the opening, he has in that manner closed some very large gaps. The place left bare by the transplanted flap is then covered in by skin-grafting by Thiersch's method. The most extensive application of this method that I know of was in a case of Schönborn,[1] in which there was an opening in the forehead six or seven centimetres broad and twenty-five or twenty-six centimetres long. Two parallel transverse incisions were made, thus outlining a rectangular

[1] Beiträge Centralblatt für Chirurgie, 1891, p. 88.

flap, the bases or ends of which on each side were not divided, but left continuous with the scalp. The scar over the opening having been resected, the outer table under this flap was then chiselled loose, and the flap with its attached fragments of bone was slipped forward so as to fill the gap. The space left by the flap was then covered by Thiersch's skin-graft. After four months, the bone having become solidified, as the patient was annoyed by the growth of hair on his forehead, Schönborn very ingeniously detached the scalp from the underlying fragments of bone, which had been transplanted by the first operation and swung it back into place, having first, of course, removed the skin-grafts which he had placed there. The bone filling the original opening was then covered by skin-grafting, so that the forehead was furnished with skin which had no growth of hair from it.

Such a bone-bearing flap can be placed directly upon the brain in spite of the ragged character of the bone-fragments on its under surface. In a case of this kind Czerny[1] had the opportunity of examining such a bone-bearing flap at a second operation and found it perfectly smooth, and Titze[2] has covered in the brain itself by a similar operation.

I have recently adopted a little different method which seems to me to possess some advantages. A young man had severe and frequent epileptic attacks in consequence of a compound fracture from the kick of a horse. On November 21, 1890, I exposed the opening in the skull, removed a considerable amount of cystic connective tissue lying over the brain, and endeavored to close the opening by transplanting a bit of bone from the skull of a lamb. The operation failed, however, since the lamb's bone underwent partial absorption, and finally the necrosed fragment had to be removed. The operation was followed by very great improvement in his epilepsy, the fits diminishing in frequency from one in about three weeks to two in a year. Within the last few months they have become more frequent, and on January 18, 1896, at the Orthopedic

[1] Verhandlungen der deutschen Gesellschaft für Chirurgie, 1892.
[2] Archiv für klinische Chirurgie, 1893, xlv. 227.

Hospital, I reopened the wound, removed a considerable amount of loose, spongy scar-tissue, the interstices of which were filled with cerebro-spinal fluid. Then, to close the opening by bone, I chiselled away the adjacent outer table of the skull in quite large fragments, by means of a gouge and hammer. I found the gouge much better than a flat chisel. These fragments were then scattered over the surface of the brain so thickly as to leave no space between any two. When I say they were placed on the brain-tissue, it is scarcely an exact statement, for they were rather placed upon the spongy scar-tissue which filled up the entire opening. When he went home three weeks later these fragments had become quite solidified, and I have every reason to believe that they will fill the opening in the skull by fusing into a true bony tissue. If so, it will be an efficient protection for his brain, and he can do without his bit of tin and the skullcap.

One advantage of this method over König's, of an osteoplastic flap, is that one can obtain as much bone as is needed from the adjacent portions of the skull, and at the same time not produce puckering of the scalp from displacing the flap on its pedicle. Another is that it does away with the necessity of skin-grafting. A possible objection might be that the nourishment of such fragments of bone would be much better if left attached to the scalp. This, from my experience in replacing large pieces of bone so frequently, as well as in the present case, is not, I think, a valid objection.

Fränkel some time since proposed to fill the opening by a disinfected celluloid plate, a procedure which has been adopted in a number of instances with very good success. I regard either of the methods already described as very much better than Senn's decalcified ox-bone, which has failed in my hands, or the use of other foreign bodies.

The Future of Operations for Brain-tumors. The future of the surgery of brain-tumors is encouraging. While there are tumors which are not found, the percentage of these is diminishing from year to year, and even in some cases in which the tumor has not been found the relief from pressure, and espe-

cially from the agonizing headache, has been very marked. Moreover, there are cases on record in which the tumor, while irremovable, has disappeared. Only last summer, I saw one case, operated on by Mr. Horsley, in which, from former experience, he expected such a result as likely to follow.

A large factor in the increasing success is that physicians who naturally see such cases first are appreciating the need for early operation, so soon as a definite diagnosis can be made and the location of the tumor can be determined. The only exception that I would make to such a rule are gummata, and even in these cases I should not be disposed to wait beyond two or three months, and possibly even not beyond the six weeks' limit proposed by Horsley.

Two-thirds of the cases submitted to operation recover, and while the later histories of many of them have not been published, yet we know that a considerable number have lived for several years and may be deemed definitely cured.

The very first brain-tumor that I operated on, December 5, 1887,[1] is still alive, and after more than eight years is in much better condition than at the time of operation, though still disabled by the atrophy of the optic nerve and more or less mental and physical disturbances, resulting from the tumor being present for twenty-four years before it was removed.

[1] American Journal of the Medical Sciences, October, 1888.

THE DIAGNOSIS OF INTRACRANIAL TUMORS.

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It would be unwise to attempt to traverse the entire subject of diagnosis of brain-tumors in the brief time allowed for this discussion, and I will therefore only direct attention to a few points in general and focal diagnosis.

The distinguished clinician and clinical teacher, John Hughes Bennett, was found after death to have a tumor the size of a hen's egg between the dura and the bone in the right temporal region. The growth had not been suspected during life, although a depression in the skull was present two inches above the ear at a point over the tumor, and had frequently been noted. Other cases have been reported in which few or no symptoms were present, or were not discovered during life. Doubtless in many of them unobtrusive phenomena were overlooked. Gliomata, and especially soft gliomata, when located in certain regions, such as the prefrontal lobe, or a lateral lobe of the cerebellum, sometimes give rise to so few of the general symptoms of brain-tumor that they pass altogether unrecognized, or are not suspected until very late in the progress of the disease. Tumors of rapid growth and firm consistence cause the most demonstrative symptoms.

In some cases the general symptoms of tumor of the brain are present and marked, but symptoms which accurately indicate its site or at least its full extension are wanting. These growths may even be situated in regions which should give rise to distinct focal manifestations, yet these are wanting.

While usually very close scrutiny of the symptomatology will reveal some symptoms which will help out the focal diagnosis, in rare instances such symptoms are entirely absent. Starr has recorded from his own experience, and has collected from neurological literature, some striking cases of this kind. A most interesting case in this connection was studied by Drs. Sinkler and Lloyd and the writer in the Philadelphia Hospital, and has been put on record by Dr. Sinkler in the third volume of the *Philadelphia Hospital Reports*. The patient was an Italian boy, aged fifteen years, who had typical general symptoms of brain-tumor, and at the time of admission to the hospital was blind from secondary atrophy after double optic neuritis. Among the few symptoms noted during his stay in the hospital were bulimia, a little uncertainty of gait, lessening of the knee-jerks, slight retraction of the head, pain commonly referred to the occiput and neck, and pain above the clavicles and down the arms. The only cranial nerve-symptoms were slight paresis of the right side of the face, sluggish reaction of the pupils, especially in the right eye, this being a trifle higher than its fellow, according to Dr. Oliver, who made a careful ocular and ophthalmoscopic examination. The autopsy showed on the left side and dorsal aspect of the pons and oblongata a soft gliomatous mass. This neoplasm involved the exits of the fifth, sixth, and seventh nerves, and to a considerable degree the regions of the nuclei of the root-fibres of these and other nerves. It extended so as to include the left prepeduncle. It was limited cephalad by the postgeminum.

In several instances I have known the mistake to be made of confounding chronic endarteritis associated with nephritis with tumor of the brain. In one of these cases the propriety of operation at the site of an old scar was discussed. The patient died at the close of a series of uræmic convulsions, and the autopsy showed Bright's disease with cardiac degeneration and widespread endarteritis. The correct diagnosis was finally made in this case by an examination of the urine, by a study of the accessible vessels, and by the discovery of a typical retinitis albuminurica, which at first had been regarded as ordi-

nary optic neuritis. Headache, vomiting, vertigo, and mental changes are not infrequently present in these nephritic cases, and the convulsions occasionally assume the Jacksonian type. Headache, as a rule, is not so severe. Youth would be in favor of tumor. De Schweinitz calls attention to the fact that brain-tumor (usually cerebellar) may cause choked disk with a star-shaped figure of whitish color in the macular region, exactly simulating the appearances usually considered characteristic of a type of albuminuric retinitis, he having seen this in the Philadelphia Hospital and at the Infirmary for Nervous Diseases.

General symptoms, such as headache, papillitis, vertigo, vomiting, and convulsions, may tell us in no uncertain tones that a tumor is present, and yet may throw no light upon its location or its pathological character. The mere absence of focal symptoms is not sufficient to enable the diagnosis of the location to be reached by exclusion; for a growth located in any one of three or four extensive regions of the brain may give rise to no focal symptoms, or, at least, to none which attract attention.

Brain-tumors may grow in or from any of the physiological subdivisions of the cortex. Their symptoms must, therefore, be considered according as they affect the prefrontal, the motor, the postparietal, and the limbic, the occipital, supertemporal, midtemporal, uncinate, and preorbital regions, or their known subdivisions.

The recorded tumors of the prefrontal lobe, when carefully studied, show that they are usually accompanied by mental degradation or deterioration and special perversions of the higher psychical faculties. These cases need most careful study, particular attention being given to the previous history as regards intellectual capacity. When the growth is small it may not be possible to detect any focal symptoms, and when it occupies the orbital surface few distinct symptoms may be present, unless it extends caudad so as to involve the olfactory bulb and chiasm, in which cases disorders of smell and sight may result. Bruns, from a study of four cases of his own, and of cases of Oppenheim, Bernhardt, and others, concludes that

disturbances of equilibrium, identical with the so-called cerebellar ataxia, occur very frequently in tumors of the frontal lobes. This symptom he believes is much rarer in tumors of other parts of the brain and is absent with considerable regularity in tumors of the Rolandic region. In my own experience this symptom has not often been present.

In the central or Rolandic region, the chief focal symptoms are monospasm or unilateral convulsions, with increasing paralysis of varying types according to the location or extension of the lesion. The spasmodic symptoms usually precede the paralysis in these cases. The spasm is often local, and generally begins in the same part in different attacks, as in the fingers, toes, or the face on one side. Invasions of the hinder portion of the left third frontal convolution give motor aphasia and motor agraphia which may be partial or complete according to the extent of the lesion. In the postero-parietal and limbic regions disorders of muscular and cutaneous sensibility are sometimes present, and can be looked for with certainty when the lesions are deep or when they are bilateral. When the gyrus fornicatus or quadrate lobule are involved, in addition to anæsthesia, local vasomotor and trophic phenomena are sometimes observed. Tumors of the anterior portion of the lateral occipital lobe, where it merges with the parietal lobe (angular region, give word-blindness, and if situated a little more posteriorly, apraxia or soul blindness. Lesions of the cuneus or calcarine region cause hemianopsia or quadrant or sector visual defects. When the tumor is situated in the superior temporal convolutions, partial or complete word-deafness, and sometimes other affections of hearing are present; while tumors of the third temporal convolution, as in one of my own cases, may give verbal amnesia with or without other symptoms. Tumors when located in the fifth temporal convolution and its vicinity cause disorders of smell, while affections of taste are supposed to be caused by tumors and other lesions of the fourth temporal convolution; but this point is not yet settled.

The cerebellum is a frequent site of tumor. I do not believe it to be in any part a latent region, as is sometimes stated, and

yet slowly growing gliomata, and probably some other forms of neoplasm, when they originate in the lateral lobes of the cerebellum, may for a long time not present recognizable symptoms. In tumors of this region some of the general symptoms of encephalic growths receive a special cerebellar stamp. The vomiting, vertigo, and optic neuritis, for example, are commonly of aggravated type; and symptoms referable to compression or invasion of the bulb or of the quadrigeminal body are frequently exhibited. The headache is often of occipital type, and nystagmus and other disorders of ocular movement are frequent.

Tumors of the callosum may give unilateral monoplegia, or hemiplegia, developing into bilateral monoplegia or hemiplegia, spasms irregularly bilateral, hebetude, slowness of speech, and irregular gait. The bilaterality of the symptoms will sometimes assist in the diagnosis. Dementia is frequent, and the general symptoms of encephalic tumor are nearly always present.

With reference to tumors of such structures as the pineal or pituitary bodies, it is of great importance to bear in mind their effects upon the neighboring parts. Symptoms referable to lesion of the chiasm, tuber cinereum, circle of Willis, and third ventricle are often present in pituitary tumor, while a growth involving the conarium may give symptoms showing the invasion of the thalamus, midbrain, and other parts.

With reference to tumors and other lesions of the projection-fibres in the centrum ovale, one general diagnostic point of considerable importance is that the nearer the lesion is to the cortex the more likely it is to give rise to isolated or single symptoms, as to paralysis of a limb or portion of a limb, or the face or portion of the face, when the lesion cuts motor fasciculi; or to anæsthesia limited to a segment of the limbs, trunk, or face, when the lesion severs sensory fibres; while on the other hand, when the lesion is deeply situated near the internal capsule, the complex of symptoms is more likely to constitute a hemiplegia or a hemianæsthesia.

Subcortical motor symptoms will be produced by lesions situated in the white substance directly subjacent to the motor

region—in the irregularly wedge-shaped mass of fibres which pass from the postero-frontal and central convolutions in converging lines to the internal capsule. Irritative and destructive lesions in this region give a symptomatology which has some points of difference from that of the motor cortex. In favor of a cortical or epicortical lesion of the motor zone are localized clonic spasm, epileptic attacks beginning with local spasm, followed by paralysis, early appearance of local cranial pain and tenderness, and increased cranial temperature. In favor of a subcortical location of a tumor are local paresis or hemiparesis, followed by spasm, predominence of tonic spasm, normal cranial temperature, and absence, slight degree or very late appearance of local headache, and tenderness to percussion.

The possibility of multiple tumors should never be forgotten. They have been reported as occurring in any number from two to a score. Tumors most frequently multiple are the tubercular, the syphilitic, and the sarcomatous. Occasionally neoplasms show a tendency to be symmetrically located on the two sides of the brain. Multiple tumors may, of course, give phenomena referable to various parts of the brain, symptoms and signs so conflicting as to make diagnosis impossible, and even to confuse the expert as to general diagnosis. In other cases, however, one growth of large size, or in an active region, takes command of the situation, and leads clearly to its diagnosis in spite of other less significant tumors. In one of my cases not only was the presence of a large tumor of the motor cortex diagnosticated, but its exact location was indicated during life. Post-mortem examination, however, showed a smaller tumor at the inferior angle of the right lobe of the cerebellum, and also some basal meningitis with effusion which had not been suspected. When operation is in question, the possibility of the coexistence of another tumor should be carefully weighed. In one case three gummata were found by me —one in the prefrontal region, another in the retrocentral fissure, and a third in the supramarginal convolution. The general symptoms of brain-tumor were present, but no localization was possible. Occasionally all the ventricles are invaded by sarcomatous growths.

REMARKS ON CERTAIN OCULAR PHENOMENA IN THEIR RELATION TO INTRACRANIAL GROWTHS.

By GEORGE E. de SCHWEINITZ, M.D.

The ophthalmic side of the study of intracranial tumors has been so thoroughly reviewed by Dr. Norris that little in addition remains to be said; but I desire to call the attention of the Fellows of the College to a few points of interest, or, rather, to emphasize a few points to which reference has already been made by previous speakers:

1. *The Percentage of Cases of Intraocular Tumor in which Optic Neuritis Occurs.* Optic neuritis in the widest acceptation of the term, as we have already heard, occurs in fully 90 per cent. of cases of intracranial growths, varying, according to the statistics, from 80 to 95 per cent. Perhaps this percentage would rise even higher if investigations were more frequently repeated, because a tumor may exist for a long time without causing papillitis, but later this symptom appears. Although neuritis may be long-continued, as Gowers has pointed out, it is none the less a transient symptom, and it should not be forgotten, when searching for ophthalmoscopic evidence of intracranial disease, that the actual inflammation of the intraocular end of the optic nerve, or, in other words, the papillitis, may have passed away, with the exception of remnants in the form of spots of degeneration in the retina, filling in of the centre of the disk, or white tissue along the lines of the vessels.

2. *The Distribution of Intracranial Tumors with Respect to the Existence of Optic Neuritis.* The best analysis of cases of brain-tumor which throws light not only upon the frequency of optic

neuritis, but upon its relative frequency, according to the situation of the neoplasms, is by Edmunds and Lawford.[1] From this paper the following table, which bears directly upon the question asked by Dr. Dercum, is quoted:

No.	Locality of tumor.	Optic neuritis.	No optic neuritis.	Per cent. of optic neuritis.
1	Anterior frontal convolutions	8	2	80
2	Motor convolutions	...	12	
3	Occipital lobes	5	4	55 5
4	In hemispheres	6	4	60
5	Ganglia at base	17	3	85
6	Temporo-sphenoidal lobes	1	2	33.3
7	Cerebellum	20	3	86.9
8	Medulla and pons	3	6	33.3
9	Meningeal growths at motor convolutions	4	1	80
10	Meningeal growths elsewhere	4	2	66.6
	Total	68	39	

It will be seen, as these authors have pointed out, that there is a comparative immunity from optic neuritis of the cases of tumor in the cortical motor area, and that the frequency and severity of papillitis in cerebellar tumors is most marked. Furthermore, Edmunds and Lawford have grouped all of the cases toward the convexity of the brain—that is, groups 1, 2, 3, 4, and 9—and find that they yield 50 per cent. of optic neuritis, while those toward the base—that is, groups 5, 6, 7, 8, and 10—constituting 61 cases, give a percentage of 74 of optic neuritis.

Tumors of the medulla are said not to produce optic neuritis. If the growth involves the medulla and pons, papillitis may be present, but when the growth is strictly localized in the medulla, inflammation of the intraocular tip of the optic nerve, if it occurs at all, must be extremely rare. According to Rath, who is quoted by Vossius,[2] tumors of the hypophysis do not cause optic neuritis. This is not according to my own experience in one case, but I am unable to prove the presence of hypophysis tumor, inasmuch as there was no autopsy. It was suspected from the clinical symptoms.

[1] Transactions of the Ophthalmological Society of the United Kingdom, vol. iv. p. 172.

[2] Lehrbuch der Augenheilkunde. p. 592.

3. *Character of the Fundus Changes with Special Reference to the Macula.* Dr. Norris has thoroughly described the various phenomena which may be observed with the ophthalmoscope in cases of intracranial tumor, varying from a high grade of papillitis, the "choked disk" of the older writers, to minor degrees of neuritis, which scarcely exceed the ordinary appearance of congestion, and I need add nothing to this subject except to refer to certain lesions in the macular region, which sometimes are so pronounced that they are singularly like the picture ordinarily considered characteristic of the retinitis of Bright's disease. An example of this kind is pictured in the accompanying-water color by Miss Margaretta Washington, which I have already exhibited to the Ophthalmic Section of the College, and which represents the right fundus oculi of a woman, aged twenty-five years, with optic neuritis and star-shaped macular figure, but with normal kidney, so far as clinical examination could determine. These macular changes formed part of the study on the alterations in the macula associated with retinal inflammation and œdema, which Mr. Marcus Gunn presented to the Ophthalmological Congress in Edinburgh, in 1894. According to this author, Dr. James Taylor first called attention to these cases, and, moreover, to the fact that the macular figure was apt to occur when the neuritis was significant of a cerebellar tumor. In a case recently seen in the Infirmary for Nervous Diseases, and studied by Dr. A. G. Thomson, the simulation of the retinitis of Bright's disease was so exact that everyone who examined the case with the ophthalmoscope at once took for granted that nephritis was present, although the kidneys were entirely normal, and the case was one, I believe, of cerebellar tumor, although—and if I am wrong Dr. Thomson will correct me—no autopsy was made.

In *résumé* I may quote what I had previously written on this subject, a sentence to which Dr. Mills has referred: "Double papillitis is highly significant of intracranial disease, especially tumor or basilar meningitis, but it is not a pathognomonic sign. Other causes, prominently Bright's disease, gout, and certain

poisons, which, indeed, may or may not be associated with the intracranial lesion, must be excluded. Conversely, brain-tumor, usually cerebellar, may cause choked disk with the appearances usually considered characteristic of a type of albuminuric retinitis."[1]

4. *Second Attacks of Optic Neuritis.* Dr. Norris has referred to relapses of optic neuritis, and epecially to the fact that in these days of intracranial surgery the opportunity for studying such relapses has been greater. I have seen one typical case, and, in conjunction with Dr. A. G. Thomson, have recorded it before this College. Briefly, it was as follows: Focal epilepsy creating the suspicion of intracranial tumor. At first there were no abnormal ocular symptoms, except passive hyperæmia of the retinal circulation and infiltration of the lymph-sheaths. One year later, the epilepsy continuing, there was distinct congestion of the optic disk, which in a few months, while the patient was under observation of Dr. Wallace, and no doubt also of Dr. Norris, in the Hospital of the University of Pennsylvania, developed into optic neuritis. On the patient's return to the Orthopedic Hospital, two years after the primary examination, this was evident as a well-marked papillitis, of the the type ordinarily called "choked disk." From this time on, with the exception of decided increase in the papillitis and depreciation of vision in the left eye, the ocular conditions remained unchanged until Dr. Keen performed the operation of trephining. Between three and four months subsequent to the operation the ophthalmoscopic appearances of subsiding neuritis began, and eight months after the operation there was fully developed post-neuritic atrophy, with preservation of good vision in the right eye and very moderate (one-tenth of normal) in the left. Nearly one year after this date the patient reappeared with the return of headache, vomiting, and other symptoms of intracranial disease, from which he had previously been free, totally blind, and revealing to the ophthalmoscope well-marked double optic neuritis, the apex of the swelling

[1] Nervous Diseases by American Authors, edited by Dr. F. X. Dercum, p. 758.

being as high—namely, 6 D.—as it had ever been in the primary attack.

The appearances of the left fundus oculi at the time of the relapse of the optic neuritis are depicted in the water-color which I exhibit. This second attack of optic neuritis has disappeared, the disks are now entirely atrophic and flat, and the patient totally blind.

5. *The Visual Field Phenomena.* Dr. Norris has described the most prominent visual field phenomena, and has particularly referred to that most important localizing sign—hemianopsia. I would like to emphasize two important points in regard to this symptom: First, that hemianopsia, although usually a direct symptom, may sometimes be an indirect sign of the disease, as the result of what the Germans called "fernwirkung," or, in other words, that it may be a distant symptom. (Swanzy.) Second, that hemianopsia may accurately localize a lesion within the cranium when that lesion is itself insignificant and unimportant, the main and essential disease being quiescent. Perhaps the best example of this has been recorded by Dr. H. C. Wood in his study of a case of large tumor occupying the second and third temporal and encroaching upon the fourth convolution, which gave no localizing sign of its presence; while a lesion in the cuneal region (a small hemorrhagic cyst) was inferred from a study of the case, chiefly from the visual phenomena, and laid bare by the surgeon's trephine.[1]

In closing, I desire to say a word in regard to the descriptions of the ophthalmoscopic lesions which are found in cases of suspected intracranial disease, and to deprecate the unfortunate admission in many reports of language which is too vague to be of much value. It does not avail a great deal to speak of "full veins," hazy retina," "cloudy disks," etc., unless the report concludes with a definite statement as to the probable significance of these appearances, in so far as our present knowledge permits. When reports are thus vaguely written

[1] This case is recorded in full by Dr. H. C. Wood, in the University Medical Magazine, vol. i. p. 383. The late Dr. Agnew performed the operation of trephining, and the surgical aspects of Dr. Wood's case are discussed by Dr. J. William White in the same number of the magazine.

it becomes exceedingly difficult to gather accurate statistics, which we so much need, as to when the fundus-changes first appear. I am far from denying any lack of thoroughness in examination or in description. I contend only for a phraseology which will enable a statistician to separate those groups in which there is evident neuritis, retinitis, perivasculitis, etc., from those in which the symptoms are common to a number of ocular conditions having no connection with intracranial disorders.

BRAIN-TUMORS, OTITIC BRAIN-ABSCESSES, AND AURAL VERTIGO.

By CHARLES H. BURNETT, M.D.

The aurist is sometimes called upon to differentiate between brain-tumors and otitic brain-abscesses, and between brain-tumors and aural vertigo, sometimes called Ménière's disease. Tumors of the brain have been mistaken for otitic cerebral abscesses. Two cases of this kind have been reported recently, one by Schwartze[1] and another by Passow.[2]

In the first case the tumor lay in the cerebellum, and in the second in the quadrigeminal body. The presence of a simultaneous chronic purulency of the middle ear led to the erroneous diagnosis in both cases of an otitic abscess in the temporal lobe on the side of the affected ear, and trepanation was performed in both instances for the relief of an otitic abscess in this part of the brain. Death ensued in both instances: eight days after the operation in Schwartze's case, and during the operation, from chloroform, in Passow's case.

In the first-mentioned case, a boy of twelve years, the brain-symptoms—viz., headache, nausea, vomiting, *double optic neuritis*, partial oculomotor paralysis, and, finally, repeated attacks of paresis of the right half of the body, the side opposite the affected ear—were, as Schwartze frankly states, symptoms of the presence of a cerebellar tumor rather than a cerebral abscess.

He was apparently misled in his diagnosis by the subnormal temperature, which prevailed in his patient for a long time

[1] Archiv für Ohrenheilkunde, April, 1895.
[2] Deutsche medicinische Wochenschrift, October 31, 1895.

before the operation, and also by the presence of a coincident chronic purulent otitis media. But the *long duration* of the cerebral symptoms, six months before the time of the operation, and the *double optic neuritis* should have inclined him to diagnose a cerebellar rather than a cerebral disorder, and that a *tumor* rather than an *abscess* pressing forward upon the ventricles, transverse and cavernous sinuses, and the ophthalmic veins. Abscess of the brain is generally too rapid in its course to occasion even *unilateral* optic neuritis, much less *double optic neuritis.* The tumor was a large gliosarcoma, occupying one-half of the medial part of the cerebellum.

In the second case, a man aged thirty years, reported by Passow, again we find a history of long duration—nearly ten years—of most of the cerebral symptoms, and also a simultaneous or coincident chronic purulent otitis media, on one side, which latter apparently misled Passow also into diagnosing an otogenous abscess in the temporal lobe on the side of the affected ear.

The cerebral symptoms consisted in increasing frequency and severity of headache, with attacks of nausea and vomiting during the last *four* years of the disease, and finally choked disk on both sides and a tendency to horizontal nystagmus upon looking outward. The left pupil on the side of the *affected ear* was the *wider*, as in Schwartze's case. Now, as in otitic brain-abscess the wider pupil is generally on the side unaffected with otogenous cerebral abscess, this symptom was in favor of the *absence* of an abscess in the temporal lobes in these two cases, at least on the side of the wider pupil, which was the side selected for operation in both instances.

In Passow's case the vision was good, the intellect dull, and, upon sitting up, the patient tended to fall backward. Trephining for the relief of an otitic abscess in the temporal lobe was begun, but the patient died during the operation from the chloroform-narcosis, and Passow takes occasion to observe that there is a probability that in intracranial lesions the patient is especially likely to succumb to chloroform, and to corroborate this he cites two cases, occurring recently in the

practice of Braun, of Königsberg, in which death ensued from chloroform during operation for the relief of intracranial lesions. In Passow's case the autopsy revealed a gliosarcoma of the quadrigeminal body.

I have had but one opportunity of observing and verifying by autopsy a case of tumor or tumors of the brain, which presented also aural symptoms, and at first led to the supposition that the case might be one of ambilateral *chronic* aural catarrh and aural vertigo. There was no purulency in either ear. This case occurred in the Pennsylvania Hospital in 1874, during the service of the late Dr. James H. Hutchinson, through whose kindness I was permitted to see the case a short time before death. If I remember correctly, it was finally diagnosed as a case of tumor of the brain. The patient was an unmarried woman, aged forty-two years, who began to complain, a year before her admission to the hospital, of pain in her forehead and vertex, increasing in severity, increasing deafness and tinnitus in both ears, unsteadiness in gait, pain and impairment of sensation in her legs, vertigo, and occasional nausea. In the course of six months all these symptoms became more pronounced, and *double optic neuritis set in* (worse on the left side). There then ensued total loss of muscular power, failure of intellect, difficulty of swallowing, prolapse of the muscles of the eyeballs, cyanosis of the face, involuntary evacuation of the urine, increased frequency of pulse, and death, preceded a few hours by a temperature of 106° F.

There was no operation, nor thought of any. The autopsy revealed *multiple brain-tumors*, as follows:

On the left side, behind the petrous bone, below the tentorium, there was found a large, round tumor two inches in diameter (*cystic*), pressing upon the left hemisphere of the cerebellum, left half of the pons, and the left crus cerebri. It extended into the left porus acusticus internus, destroying by pressure the auditory nerve and its expansions in the labyrinth.

On the right side the e was a smaller tumor (*fibrous*) adherent to the posterior surface of the temporal bone, extending

inward through the porus acusticus internus to the labyrinth, where it had destroyed all the nerve structures as revealed by the microscope.

From these three cases we may conclude that a *long duration* of the brain symptoms, a year or more, and, finally, *double optic neuritis* are symptoms of tumor of the cerebellum or vicinity, in the posterior fossa of the skull, rather than of abscess in the temporal lobe of the brain.

Double optic neuritis,[1] or choked disk, may be a symptom of *otitic cerebellar abscess;* but then there would be other symptoms pointing to the existence of intra-cranial abscess of otitic origin.

In making a differential diagnosis between aural vertigo of tympanic origin (sometimes erroneously called Ménière's disease) and a brain-tumor, it must be borne in mind that in ear vertigo there are found always deafness and tinnitus, with objective symptoms of chronic catarrh of the middle ear, and at times demonstrable ankylosis of the malleus and other ossicles. The vertigo is nearly always paroxysmal, excepting in very chronic cases, when there may be a constant disturbance in equilibrium. However, there is entire absence of severe headache and paretic symptoms, even in the worst forms of ear-vertigo.

In brain-tumors, even if there be coincident tinnitus and deafness, the vertiginous tendency is *constant* and the headache is *continuous* and *severe*, paretic symptoms set in soon and increase in severity, and double optic neuritis at last makes its appearance, especially if the lesion is in the region of the cerebellum or at any point interfering with the circulation of the cavernous sinuses and ophthalmic veins. If the vertigo is shown to be of tympanic origin, and therefore due to retraction and ankylosis of the ossicles, with consequent impaction of the stapes in the oval window, and reflex irritation of the cerebellum, liberation of the stapes by surgical removal of the incus, *the membrana and malleus being left in position*, will per-

[1] Hansburg: Archives of Otology, January, 1895; and Risler: Journal of Nervous and Mental Diseases, August, 1894.

manently relieve the aural vertigo in most cases, according to my experience, based upon *twenty-six* such operations within the last eight years.

DISCUSSION.

Dr. J. Hendrie Lloyd: I have very few statements to offer about brain-tumors that convey anything new. The whole subject has been so thoroughly gone over in the past that very little remains to be said. It has seemed to me best to refer to a few points that have arisen in my own work. In quite an extensive clinical experience with brain-tumors a few points have come up time and again, which seem to me of sufficient importance to be introduced here to-night in a discussion of this kind.

I shall speak first with reference especially to diagnosis, as this bears directly upon the practical subject of the treatment of these cases. Of course a great many brain-tumors are beyond the aid of either the therapeutist or the surgeon, and unfortunately such cases usually offer problems merely for scientific curiosity. But there are some, and a very important class, of these neoplasms which do offer problems for both the surgeon and the therapeutist. Within a few years I have met with two or three instances in which brain-tumors were not diagnosed, although they were located where they could very readily have been reached by the surgeon. I think in some cases the simpler the diagnosis of brain-tumor the more misleading on some accounts it may be. This is true especially in those cases in which the neoplasm is entirely in the motor cortex. I suppose that there is no place where brain-tumors are watched for more carefully than at Blockley, and yet all of these cases occurred at Blockley. These patients with neoplasms in the motor regions, giving all the classical symptoms, were practically overlooked, and the operation was only performed on the post-mortem table. The reason, I take it, for this is that the very simplicity of the case on some accounts misleads the observer. These cases sometimes resemble superficially an ordinary case of hemiplegia (two cases that I can recall now had hemiplegia as a distinct symptom), and where, as in Blockley, we have such a large number of hemiplegics, hemiplegia does not offer much novelty. In this way an observer may be misled rather to neglect the study of ordinary hemiplegia when it occurs as a symptom of brain-tumor.

These cases in fact may be confused by a hasty observer with cases of ordinary hemiplegia from hemorrhage or embolus in the basal ganglia. In cases of tumor of the vault some of the classical symptoms of brain-tumors may be absent, as optic atrophy, and vertigo and vomiting especially.

In reference to diagnosis of these tumors in the motor area, I think the most important symptom is the onset of convulsions. The ordinary focal

epilepsy, beginning in a limited muscle-group, should usually put us on our guard, and yet I do not feel quite so much confidence in these classical tests as I formerly did, because I have seen them put in operation several times and I have been disappointed. All of us who are on duty at Blockley will probably recall very distinctly the case of a man in my wards, named Smith, operated on by Dr. Deaver, who had the symptoms of a strikingly localized lesion, probably tumor in the motor regions. Two operations have been performed and no tumor has been found, and the man is still going about having some mild attacks of focal epilepsy. For the last two or three years he has been better, probably because Dr. Deaver took out some of his motor cortex.

As to the onset of convulsions. It occasionally happens in these cases in which the paralysis takes on a hemiplegic type that convulsions are not an early symptom. The onset of focal epilepsy does not always reassure me that we have a distinct focal lesion that can be reached. We have two cases now in the Philadelphia Hospital of this very type. One I saw yesterday; the patient is now under the care of Dr. Mills. He has distinct focal epilepsy of the face and arm and also paralysis of these parts. I have not had an opportunity to study the case very carefully, but I think Dr. Mills has come to the conclusion that the patient has brain-tumor. Still, while history points to brain-tumor, certainly it is not clear enough to warrant a perfect diagnosis. There may be a localized meningitis instead.

Only last week I had another case in a man who has within three months taken on symptoms of focal epilepsy involving the face and right arm. In this case there have been from the beginning optic atrophy and severe headache limited to one side. This brings up a second question from the diagnostic and therapeutic standpoint—viz.: the differentiation of brain-tumor from early syphilitic disease.

Now, I think that this, in many cases, is a very grave question. If there is anything in the antisyphilitic treatment of brain lesions we can only hope to get beneficial effect by very early and very prompt action. The early diagnosis, for instance, of a beginning syphilitic meningo encephalitis which may lead in time to gummatous tumor is of very great importance if we are to derive any benefit from the treatment. I must confess, however, that with the ordinary antisyphilitic treatment in many of these, as well as in cord lesions, I have been disappointed. The recognition of an early focal syphilitic lesion, which, in time, may form a syphilitic gumma, and its prompt eradication by antisyphilitic treatment are by no means as easy and common achievements as one might be led to imagine from some of the literature. I feel, from careful study of late reports, that really we ought to give the hypodermic treatment with mercury a more thorough test, especially in these cases of grave nerve lesions. Our Blockley wards present us very many grave nerve lesions, beginning in syphilitic patients, in whom we have every reason to believe that these lesions are syphilitic, yet the ordinary treatment with iodide of potash and inunction of mercury does not give satisfactory results.

We should endeavor to bring to bear upon these patients the action of mercury in the promptest possible way. The reports of some European observers seem to prove that the hypodermic use of mercuric chloride or gray oil acts more promptly in nerve-lesions, as well as in lesions of the eye and other vital tissues of the body, than does inunction.

A French surgeon, at a recent meeting at Lyons, claimed that in cases in which mercury is given by the mouth in ordinary pill-form it very frequently does not appear at all in the urine; when it is given by inunction it may appear in the urine in a week or ten days; when given hypodermically it nearly always appears in the urine in the first twenty-four hours; this is a physiological test, and it seems to prove that the absorption of the drug when given under the skin is much more prompt than by other methods. This is a little apart from the subject, excepting in so far as it refers to the early growth and treatment of syphilitic lesions which in time form neoplasms.

For tumors about the base of the brain and the cerebellar region little can be done. In a case under observation at present, however, the question of trephining has arisen. The man has symptoms of cerebellar tumor, as forced movements to one side, optic atrophy, vertigo, vomiting, and occipital headache, with abolished knee-jerks. The motive for trephining is supplied by the fact that a few years ago the patient had a severe injury in the occipital region, and now has great irregularity of the occipital bone, as though it might have been fractured. Considering the location of the injury and the probable location of the tumor, the prospect for success is not encouraging, and the dangers of the operation are very great.

Finally, a word about multiple tumors of the brain. The possibility of multiple tumors should never be ignored, especially when an operation is intended. In a recent case in which I conducted the autopsy I found four distinct tumors. A tumor was in each hemisphere, in the ascending convolutions bordering the fissure of Rolando; a third was near the angular gyrus on the left side; and a fourth, smaller and more recent, was still in another locality. They confused the diagnosis very much, and, of course, they would have seriously interfered with successful surgical treatment.

Dr. F. X. Dercum: In regard to the first point made by Dr. Mills, that gliomata every now and then fail to give rise to symptoms, it suggests to my mind that there is another form of brain-tumor which is also apt to be present without focal symptoms—that is, cholesteatoma. I have seen one case where such a tumor was present, involving the ascending frontal and posterior portion of the second frontal convolution, without giving rise to any focal symptoms whatever. There were present in this case simply general symptoms of brain-tumor, headache, optic neuritis, the latter being of rather high grade and plus knee-jerks.

Regarding the affections that complicate the diagnosis of brain-tumor, there are several forms of meningitis which render the diagnosis every now and then difficult, and especially (as Quincke pointed out some years ago) is

this the case with *serous meningitis*. This is accompanied by constant headache, though the patient is often able to be around and about just as in brain-tumor; there are no focal convulsions or other localizing symptoms, but optic neuritis is present just as in brain-tumor. There is a very important point, and I remember to have seen one such case.

The occurrence of focal convulsions in Bright's disease has been established by numbers of observations made both abroad and in this country, and it is perfectly true, as Dr. Mills has stated, that these convulsions may be *strictly* focal in character. While we are upon the subject of convulsions there is another and very important point to remember, and one which my own experience has demonstrated to be a fact on several occasions. It is that in brain-tumor the convulsions are not necessarily focal, but may be general—that is, the symptoms may simulate essential epilepsy, and unless we are careful to examine as to headache, and to make tests as to localized weakness, changes in knee-jerk, and so on, we may fall into error. We should be very careful in making the diagnosis of ordinary epilepsy to eliminate this class of convulsions.

In regard to tumor of the frontal lobe, though I have seen a number of such cases, I have never observed typical ataxia in any of them. In abscess of the frontal lobe, I have seen boulimia, though I have not noted this symptom in tumor. I doubt, however, whether this fact should serve us in distinguishing between the two lesions. Boulimia we may see in cerebellar tumor.

With regard to the irregularities often revealed by the hemiplegia of brain-tumor, mentioned by Dr. Mills, that is a point of very great importance. We must remember, however, that there are certain forms of hemiplegia due to hemorrhage or softening, which do not conform to the ordinary type. Thus, we every now and then see the so-called leg-sensory type, in which the palsy is more pronounced in the leg, the case being at the same time complicated with very marked hemianæsthesia. However, even here various facts enable us to make the distinction. The hemiplegia in brain-tumor comes on gradually, not suddenly. Very frequently anæsthesia makes its appearance first, which is always a suspicious symptom. We must not be misled by the fact that every now and then we have localized bleedings about the tumor, giving rise to pseudo-apoplectic attacks. Here the diagnosis depends upon the accuracy of the detailed study of the case.

In regard to the interesting point alluded to by Dr. Lloyd as the diagnosis between syphilis and brain-tumor, there is one cardinal fact to bear in mind—syphilis of the brain by itself does not, in my experience, exist. Syphilis is always a cerebro-spinal disease, and if we carefully look for cord-symptoms we will have no difficulty in finding them, although brain-symptoms may overshadow everything else. If we get cord-symptoms in a given case, it will enable us to make a decision at once. In regard to the treatment of syphilis by the hypodermic method, my own experience has not inclined me

to its use. In a number of cases in which I have tried this method I failed to get decisive results, and when I resorted to the old method of inunction I got very marked and very rapid results. What the explanation is I do not know, unless it be that the mercury when used by the skin makes a massive and very gradual impression—that is, the drug is retained long enough to enable it to exert its peculiar effect upon the specific exudation.

In speaking of cerebellar tumor we should remember several points of very great importance—*e. g.*, the knee-jerks may differ at various periods of the history of the same case. We frequently find the knee-jerks plus in cerebellar tumor. Later on in the same case we may find that knee-jerks are lessened or absolutely gone. Recently studies by Mayer and by Dinkler have made it probable that in at least some of these cases there is a tract degeneration taking place in the cord, possibly in some way connected with the lesion in the cerebellum. In a case which I myself very closely studied, no such change could be detected, and perhaps the loss of the knee-jerk can in this instance be explained by the extensive destruction of the cerebellum. In other cases, again, an absent knee-jerk may be replaced by one that is exaggerated. Here the explanation may lie in an irritation of the cerebral motor tracts in the pons or medulla.

There are two other important symptoms in cerebellar tumors, loss of sight and partial or complete loss of hearing. The loss of vision may be due to pressure upon the anterior quadrigeminal bodies or upon the chiasm by the distended floor of a dropsical third ventricle. The loss of hearing may be explained by pressure upon the auditory nuclei or auditory nerves, but, as I believe was the case in one of my own patients, it may be due to pressure upon the posterior quadrigeminal bodies ; these appear to bear the same relation to the auditory tract as the anterior quadrigeminal bodies bear to the visual tract.

The question of the diagnosis of abscesses from tumor is exceedingly interesting, but opens up so extensive a field that I cannot discuss it here. The question of diagnosis from aneurism is very interesting, but time will prevent my entering into it.

Headache is one of the most common symptoms of brain-tumor, but every now and then it is absent. Every now and then subcortical growths fail to give rise to headache, while in other cases they give rise to very intense headache. Headache probably depends at times upon the situation of the growth. Of course, if the growth impinges upon the dura, we can understand why pain is present.

Further, in brain-tumor headache is not necessarily continuous from day to day. I remember very well a case I studied some years ago for many months, in which variable headache was present; some days it was very bad, sometimes not present at all, and yet when this man came to autopsy two enormous hæmatomata of the dura were found. With this enormous increase within the cranium, an increase of bulk and concomitant increase of pressure, the headache had been anything but constant.

Dr. William Thomson: The connection and significance of double optic neuritis with tumors of the brain have been so well set forth by the previous speakers that I will content myself by presenting the College this photo-micrograph, taken by Dr. Wallace, of a preparation made by me of a characteristic choked disk, from the eye of a young man who died of a tumor pressing upon the cerebellum.

The full account of the case can be found in the *American Journal of the Medical Sciences* for July, 1873, and has for us the historical interest that it gives the details of the first case in which the ophthalmoscope was relied upon to aid and confirm the diagnosis of brain-tumor in this city.

The patient was under the care of the late Dr. Keating; Dr. Mitchell was in consultation, and the late Dr. Dyer made the examination with the ophthalmoscope, and observed, measured, and described the appearances of the optic papillæ.

At the autopsy I was able to demonstrate the swollen appearance of the disk, and later on to make and preserve a section of it, which is represented in the photograph. This case occurred in 1872, and is an evidence of the use of the mirror at that time in the treatment of nervous diseases. No one then ever hoped to see the day when the surgeons would venture to remove such tumors. I now gladly make way for the remarks on the aspects of brain-tumors of our daring operators.

Dr. J. M. Da Costa: I have listened with great interest to the debate. There are many matters connected with the distinction of tumors from general morbid states that could be, had time permitted, much more fully dwelt upon. The similarity to certain forms of Bright's disease, clearly brought out to-night, is very valuable.

The reason why so little has been said concerning cerebral localization is probably because there is nothing in cerebral localization of tumor different from localization of any other lesion. The recognition of the kind of morbid growth is never very satisfactory, generally only a matter of surmise.

Several points of individual experience come to my mind with reference to general clinical facts; among them there are certain cases of slow poisoning which give rise to choked disk and appearances of tumor. It is known that lead-poisoning may do this, and I have noticed that people who take chloral to excess have choked disk, and that chloral-eaters will have symptoms of brain-tumor. The first case that taught me this was seen several times, and the eye-examinations were made by one of our most distinguished ophthalmic surgeons, who expressed no doubt of the nature of the lesion. The diagnosis of brain-tumor was made, based on the eye-appearance, the steady headache, and some uncertainty of gait. Finally, the true cause was discovered by finding chloral-bottles in the room; the patient was carefully watched, the chloral-habit treated, and perfect recovery ensued.

Another point is this, that in the relief of headache in brain-tumors, sometimes very large doses of iodide of potassium will do good, and this is probably

because it modifies the surrounding inflammation rather than from any direct action on the tumor. Moreover, it does not follow because a case improves under treatment of the kind that it is a gummous tumor we are dealing with, because—whether from secondary inflammation being modified or not, the symptoms being strikingly relieved—that may be witnessed in any form of morbid growth. This, too, I know from experience and in cases that have been followed out finally to the autopsy.

Dr. C. K. Mills: Much more might have been said about the focal symptomatology and diagnosis of tumors. Dr. Dercum spoke about the diagnosis of subcortical growths in the motor region, and referred to the question of the existence of tonic spastic conditions under these conditions. I believe that there is a certain amount of value in this symptom. I am sorry that more attention was not paid to the general diagnosis of brain-tumor and to the diagnosis of tumor from such conditions as hysteria, neurasthenia, and general paralysis of the insane. These are among the diseases which present special difficulties in diagnosis at times. The concurrence of hysterical manifestations with symptoms of brain-tumor is so frequent that the diagnosis is very often not correctly made. Here the ophthalmoscope is often the method of differentiation.

SOME OF THE SURGICAL USES TO WHICH CARBOLIC ACID OF OFFICIAL STRENGTH HAS BEEN APPLIED.

By OSCAR H. ALLIS, M.D.,
SURGEON TO THE PRESBYTERIAN HOSPITAL.

[Read March 4, 1896.]

The medical profession has been placed under lasting obligations to Sir Joseph Lister for popularizing carbolic acid in surgery. By a series of operations conducted with great care and fairness he demonstrated that it was possible to promote the healing process in wounds without the usual, or at least too frequent, accompaniments of inflammation, and that inflammation and its handmaid, the "laudable pus" of earlier writers, were not only wholly unnecessary, but their presence was rather a witness against the surgeon that his work had been performed in a defective manner.

The method of Lister was not due to a happy inspiration, but rather to the demonstrable principle that organisms are floating in the air we breathe that are capable of infecting a freshly cut surface; and he therefore conceived the principle that if operations could be performed in a sterile medium the highest possible results would be obtained. Hence the steam atomizer and carbolized spray.

The arguments of Mr. Lister were so cogent and convincing, the series of cases so numerous, varied, and extending over so long a period, their contrast with statistics of his own previous work and that of other surgeons so striking and convincing, that surgeons throughout the civilized world were soon familiar with his processes, employing them in their own work. The

results were, however, in a measure unsatisfactory. In many instances, either from lack of skill, judgment, or detail, results did not follow that were anticipated; while in others, a prolonged detention, often an hour and more in the carbolized atmosphere, had a most depressing influence upon surgeon and patient, and in some instances, no doubt, contributed to fatal results.

Lister's methods were short-lived, but the impetus he gave to surgery, raising it almost to the dignity of an exact science, has entitled him to the honor of being one of the epoch-forming characters of the world.

My first unfavorable experience with carbolic acid was in a case of empyema in a strong, middle-aged adult, male. Drainage through and through with gum tubes had been established and various injections employed, but as the case did not progress satisfactorily, Dr. K., with whom I was associated in the treatment of the patient, injected a quantity of tepid, very dilute carbolic acid. The nature of the drainage was such that the injected substances were not retained, but readily drained away, after which the patient was dressed and left in his usual condition. A half-hour later Dr. K. was summoned to his patient's aid, whom he found in a state of profound collapse, due, as we both believed, to the absorption of the dilute acid.

A second case of a somewhat different nature occurred to me in my work. While removing two cysts from the inguinal canals of a middle-aged female, similar in many respects to hydrocele of the cord in the male, my patient became suddenly almost pulseless, and was revived with difficulty. I attributed the condition to the effects of ether, as I did not think it could be due to shock from an operation of such a trifling character. A half-hour later, on my way home, both hands and arms became suddenly numb—I say suddenly, as I had not previously detected any premonitory symptoms, and with the numbness came the true significance of the collapse in my patient, whose freshly cut wounds had rapidly absorbed the powerful agent. With such lessons of the benumbing and paralyzing effects of

dilute carbolic acid, you can well imagine my surprise when Dr. B. F. Gardner, of Bloomsburg, Pa., asked me if I ever used the crystals of carbolic acid upon a flesh wound. Upon my replying in the negative, he told me that it was his custom to take the pure crystals and apply them to the cut surfaces after such extensive dissections and exposure as accompany the removal of the breasts or an amputation of the thigh. After the application, thoroughly made to every part of the wound, the surfaces were washed with water that had been boiled, then dried and closed with drainage, and that primary healing throughout the entire extent was to be expected. Although I inquired carefully into his method, I dared not follow it. It emboldened me, however, to use the pure acid freely in operations upon suppurating glandular tumors; and in one instance stood me in good turn, when a recent amputation below the knee showed at its first dressing that it had become infected, and was swollen and angry. Acting upon the suggestion of Dr. Gardner, I removed all the sutures, separated readily the cut surfaces, which I found covered with a dark gray, semi-organized material, and with deliquesced carbolic acid mopped over the entire cut surfaces; to my surprise the patient evinced no pain. The wound was not again closed, but dressed with gauze packed between the flaps. Very soon healthy granulations sprang up, after which the flaps were approximated and the two parts healed.

By degrees my confidence in it increased until I can now, after ample trial, fully indorse all that Dr. Gardner told me on that occasion.

I will select only two confirmatory cases from my own practice: In November last I was asked to operate upon a lady, aged forty years, helpless from an ununited femur. The fracture had occurred in the upper third. To get at the fragments I isolated them from their muscular attachments sufficiently to bring them to the surface of the wound and enable me to freshen the ends, which required an extensive dissection. After bringing the bones together with two carpenter's screws, the whole area was mopped out with strong carbolic acid, then

flushed; the wound sutured, with temporary drainage near the middle, and the whole encased in plaster-of-Paris. The drainage was removed at the first dressing on the third day, after which the entire wound healed, leaving the screws encapsulated. This is the first and only time that I ever used carbolic acid in a case of ununited fracture, and the first and only time in which the screws did not gradually work their way out of the bone as the reparative processes advanced.

My other illustrative case is that of the removal of a large mammary tumor. Its removal necessitated a great exposure. Both pectoral muscles were dissected from their thoracic and tendinous attachments. After the removal the whole was bleached with an application of strong carbolic acid. Result: primary union except where drainage had been applied.

I am not rehearsing these exploits of carbolic acid with a view to establishing a position for it in the field of surgery. What I desire is simply to emphasize that which will bear many repetitions, that carbolic acid in its pure state exerts no sensible necrotic action upon freshly cut tissues, and will not, when properly applied to them, interfere with primary reparative processes. I ask no one to repeat what Dr. Gardner has taught me is possible; all I ask is that the intelligent reader will discriminate between pure crystal or deliquesced carbolic acid as an application to a freshly made wound, and a 2 per cent. solution of the same acid used under the same circumstances. In the pure state this agent is said to combine with the albumin of the freshly cut tissues and to form an *instantaneous protective albuminate*, performing a twofold office, that of sterilization and local anæsthesia. It does not act in any sense or degree like a strong mineral acid, which readily *destroys* every animal tissue with which it comes in contact, and continues its necrotic action so long as any free acid is present. Carbolic acid in the pure crystal applied to freshly cut wounds is in no sense a destructive, as has been abundantly proved by its non-interference with primary reparative processes. The error under which the medical profession has long reposed, viz., that official carbolic acid is a powerful destructive, and to make it safe

it must be largely diluted, is a natural but most dangerous conclusion. Were I to be asked to decide between the alternatives of a gallon of deliquesced carbolic acid or an ounce of carbolic acid in a gallon of water, to be poured into an empyæmic lung chamber, I should unhesitatingly take the former, nor would I feel that my patient would be subjected to the slightest risk by so heroic a procedure. In the application of a gallon of pure carbolic acid I should feel that I had in reality done nothing more than to paint the surface with a camel's-hair pencil; that the moment the strong solution came in contact with the tissues it rendered all further action of the drug inert and powerless.

Of all the uses for carbolic acid in its strong undiluted form I have reserved the most beneficent if not the most important for the last, namely, its application to freshly burned surfaces. A few weeks ago, while I was at the Presbyterian Hospital, a case of scald of first degree of the neck, breast, and hands was brought into the receiving ward. I found the accident had occurred to a nursing mother, who was in great agony. I immediately asked for the carbolic acid, and taking a mop of cotton in the dressing forceps began the application. The woman was in such agony that she implored me not to touch the burned surfaces with the "acid," and wherever I touched it she cried out with alarm; but hardly had a minute passed before her eyes closed as if to fall asleep. When I asked her if she still felt the pain, she replied: "Yes, in my hands." She had suffered so much agony before she hardly knew where she was burned, and the best testimony of the instantaneous relief of her breast was that she now felt the pain in her hands. For this contribution to the relief of the most agonizing and depressing of man's possible afflictions, the profession is indebted to Dr. B. H. Brodnax. The *rationale* of the relief is probably the same in burns as in cut surfaces. The exposed and agonizing nerve-filaments are instantly sealed and thus rendered insensible, and the transition from maddening torture to ease almost as by magic.

I know of no subject so worthy of dissemination among the

medical profession as this application of pure, undiluted carbolic acid to burns. As its action in the pure state is strictly local, it cannot make any difference whether we are dealing with the simplest or most aggravated and extensive burns. Instead of waiting for a nurse to spread her balsams and cerates upon lints, and inserting our hypodermatic needle to give relief—a relief that comes tardily and imperfectly and often only with a stupefying amount of morphine—the whole surface can be placed in best possible condition for repair and with instantaneous relief by the simple application of this agent.

There are minor uses to which the strong acid has been applied, such as painting with camel's-hair pencil a painful external hemorrhoid, painting the prolapsed bowel, passing it on a pledget of cotton to the fundus of a subinvoluted uterus, painting a bubo or felon before lancing; but these uses come naturally with its use in graver maladies, and do not call for extended notice.

DISCUSSION.

Dr. John B. Roberts: We are all familiar with the fact that undiluted carbolic acid is a good local anæsthetic agent for application after burns, and in Dr. Levis's term of service at the Pennsylvania Hospital, years ago, he was in the habit of using it for this purpose after the application of the actual cautery. He used either the pure acid or diluted it with a few drops of glycerin. Following his practice, I am always in the habit of using carbolic acid after the actual cautery. I have also applied it previous to opening an abscess; generally with results equal to cocaine. It is a good local anæsthetic.

Dr. John Ashhurst, Jr. (in response to a call of the President): I regret that I came in so late that I did not hear Dr. Allis's paper. Surgeons are, of course, familiar with the local anæsthetic effect of carbolic acid, which has been known for years. The reason that it has not been generally employed is that where used in sufficient strength to cause anæsthesia, it produces sloughing of the integument. It is, however, quite possible that in the case of tissues already destroyed by a burn, its caustic action might not be objectionable.

Dr. George Erety Shoemaker: I would like to illustrate the well-known destructive effect of carbolic acid by the report of a case. A patient applied several years ago to a hospital service with which I was connected, with the history of having asked a druggist for a carbolic acid lotion to be applied for a trivial injury of her finger. He had furnished her with the pure acid instead of a solution. She had applied this with the result of completely destroying the skin. This was followed by sloughing, which subsequently required the amputation of the finger.

Dr. Allis: As Dr. Ashhurst did not hear the entire paper, I may repeat that after an amputation, such as a removal of the breast, the application of the pure crystals of carbolic acid brushed over the whole surface has not, in my practice, been followed by sloughing; but, on the contrary, primary union has followed. I have repeatedly after amputation of the breast mopped the entire surface with the pure acid, and after washing away the blood and other matter, and cleansing the wound, primary union has not been interfered with. In regard to the application of carbolic acid to burns, it is not, as Dr. Ashhurst suggests, simply unobjectionable when the tissues are destroyed, but will be found to be a valuable application in every degree of destruction from a burn.

THE CLINICAL APPLICATION OF THE RÖNTGEN RAYS.

I.

THE APPARATUS AND ITS USE.

By WILLIAM FRANCIS MAGIE, Ph.D.,[1]
PROFESSOR OF PHYSICS AT PRINCETON.

[Read March 4, 1896.]

The apparatus with which most of the work was done, which is described in this article, was essentially similar to that used by Röntgen in his original work. The Crookes's or vacuum tube was excited by a large inductorium or Ruhmkorff's coil, made by Apps, of London, and belonging to the Physical Collection of Princeton College. The coil is 14 inches long and 8 inches in diameter. When actuated by 6 or 8 cells, made by the Electric Storage Battery Company of Philadelphia, each having an electro-motive force of about 2 volts and a capacity of about 150 ampère-hours, the instrument ran steadily and gave a spark six inches long between points in air at each break of the primary current. A smaller inductorium, with a coil $9\frac{1}{2}$ inches long and 6 inches in diameter, was also used successfully, but the larger coil seemed most efficient, and was used in most of my work. It is probable that when the vacuum-tubes are improved the Röntgen action may be obtained by the use of much less expensive apparatus than that here employed. It is hardly necessary to state that any voltaic cells or storage-batteries may be used as the source of current, and that care must be taken that no higher electromotive force is present in the circuit containing the primary

[1] Not a Fellow of the College.

coil than that which the coil is designed to bear. This is generally not greater than 12 to 15 volts, and with smaller coils may be less. It is then manifestly impossible to use the current from a city supply directly with the coil. If it is used at all, a shunt must be introduced. The best form of shunt is the proper number of cells of a storage battery, which can be receiving their charge at the same time that they are setting the coil in action.

The vacuum-tubes used in my first trials were in the collection at Princeton ;after they broke down, others obtained from Queen & Co., Philadelphia, were found equally serviceable. My experience agrees with that of others, that the ordinary Crookes's tubes differ very much in their efficiency. Of those in the Princeton cabinet, only three or four, when tested by the *skiascope*, showed that they were furnishing an abundant supply of the Röntgen rays ; and most of those on sale in the shops are worthless. The cause for the superior excellence of some tubes over others seems to lie largely in the different thickness of the glass wall. This has been stated by Mr. Edison, and an observation which I made suggested the same explanation to me.

One of the Crookes's tubes with which I worked had the form of a nearly spherical bulb with two conical projections. Four aluminum electrodes were inserted into this bulb, two at the ends of the conical projections, the other two, one a straight wire, the other a flat disk, through the wall of the bulb. Those who are familiar with the ordinary form of the Crookes's tubes will recognize this at once as the one furnished as a companion to another of similar form, but less highly exhausted, to show the difference between the Crookes's cathode-action and the ordinary stratified discharge. If the flat disk-electrode of this tube was made the cathode, a patch of green phosphorescence appeared on the opposite wall of the tube. This spot I made the source of the Röntgen rays in my first attempt to get a photograph; though sufficient was obtained to show the Röntgen effect, yet the action was very feeble; and when the tube in this condition is examined by the skiascope it is evident that

the tube is not doing efficient work. Other tubes in which the cathode-rays travel long distances from flat electrodes before they fall on the glass show similar feeble action. When any one of the three wire electrodes was made the cathode the characteristic green phosphorescence appeared around it; in the case of the electrodes in the projections the phosphorescence was very brilliant and confined almost entirely to the walls of the projection. Contrary to my expectation, I found that the tube, when these electrodes were cathodes, gave little or no evidence of the Röntgen rays. The only electrode which made an efficient cathode was the wire projecting into the bulb. When it was made the cathode all parts of the surface of the bulb became phosphorescent, with a yellowish-green light, and the skiascope showed a copious emission of the Röntgen rays. By placing in front of the bulb a plate of lead in which a hole about three centimetres in diameter was cut, the rays from all but a small part of the surface of the bulb could be cut off and the efficiency of different parts of the bulb tested with the skiascope. It became at once evident that the most efficient parts were the thin walls of the bulb, and that the places where the glass was thicker exhibited the action either less well or not at all.

If the Röntgen rays are excited, as Röntgen says, where the cathode-rays fall on the glass, and therefore start at the inner surface of the bulb, the known resistance of glass to the passage of the rays will easily explain this observation.

Another requisite for the production of the Röntgen rays seems to be a high vacuum in the tube. Some observers have made statements which contradict this, but my experience with the tubes in the Princeton cabinet, as well as with others that have been made for me, generally supports it. Some ordinary Geissler tubes, however, showed the Röntgen rays. They were such as had a narrow portion made of uranium glass. This portion seemed to be the source of the rays. I have used one of these tubes with the photographic plate with good results.

The photographic plates used were Hammer's Extra Fast,

Carbutt's Eclipse, and plates specially prepared by Carbutt for the Röntgen rays. Most of the pictures of this article were taken on the Carbutt's Eclipse plates. One of them was taken on a freshly prepared Carbutt's special plate, with a material reduction in the time of exposure.

To take a picture or skiagraph by the Röntgen method the photographic plate is placed in an ordinary plate-holder, or shut up carefully in a cardboard box, such as those in which photographic plates are sold, with the sensitized surface turned toward the object to be taken. The plate in its holder is then placed in a convenient position, so that the object may rest upon the cover of the plate-holder, or at least be as near it as possible. The vacuum-tube is set up so that the most efficient part of its surface confronts the plate. I have found that in the case of objects like the bones of the hand or arm, which cannot rest directly on the cover of the plate-holder, increased distinctness of definition is obtained by using as a radiant surface only a small portion of the tube, shutting off the rest by means of the sheet of lead already mentioned. This greater definiteness of outline is gained at the expense of longer time required for the exposure and of less marked contrasts of light and shade. For much work the whole tube may be used, and a fairly definite outline secured by setting the vacuum-tube at a greater distance from the photographic plate. When the radiant source was that portion of the tube which was exposed by the circular hole in the lead diaphragm, the vacuum-tube could be set about 6 or 8 inches from the plate, and a good picture taken of thin objects, like the hand, by an exposure of one hour. When the whole tube served as a source, an exposure of an hour for the thinner and an hour and a half for the thicker objects was sufficient, the tube standing 12 inches or more from the plate.

It should be noticed that the outline will be better and success more certain if those parts which are specially desired are brought as close to the plate as possible. The proper relative positions of object, plate, and tube may be readily seen by remembering that these pictures are shadow pictures, and that

if for the vacuum-tube we were to substitute an equally large globe of ground-glass, illuminated from within, the object would cast a shadow on the plate very like that which it makes in the Röntgen rays. The arrangement which will cast the best-defined shadow of the desired object will yield the best results.

The photographic plates are developed in the ordinary way. As the pictures are only shadows, and no artistic effect is required, the development can be pushed further than would be suitable with an ordinary plate, with the result sometimes of bringing out detail that does not appear at first.

The *skiascope*, to which reference has already been made, is an instrument designed to take advantage of the fact that the Röntgen rays cause fluorescence in certain substances, to make direct visual observation of these rays and the shadows cast by them. The fluorescent substance which I have used is the double cyanide of platinum and barium, which is so excellent for the observation of the ultra-violet rays of light, and whose usefulness in connection with the Röntgen rays was announced by their discoverer. Much of the salt which I have obtained from the chemists either exhibits no fluorescence at all with the Röntgen rays, or only a trace of it, and I cannot at present state the conditions of preparation which will insure good fluorescence.[1] The successful results which I obtained were secured with a piece of platino-bari-cyanide paper imported from Germany recently for the Princeton cabinet. A circular disk cut from this paper was fastened, with the fluorescent side inward, by non-actinic black photographer's paper in one end of a brass tube blackened on the inside. By fitting the other end of the tube around the eye, both the eye and the fluorescent substance are protected from the light. When this instrument is anywhere near the excited vacuum-tube, provided that the Röntgen rays can fall directly on the fluorescent paper, the fluorescent salt will glow, and the shodows of objects interposed between it and the vacuum-tube appear upon it. It is

[1] Dr. G. D. Rosengarten has investigated for us the chemical and physical properties of the platino-bari-cyanide.

advantageous to bring the interposed objects as close to the paper as possible. The shadows thus cast have the same distinctions of intensity that they show by their action on the photographic plate. The outlines are generally not so distinct as they are on the plate. With a larger sheet of the fluorescent paper a larger instrument of the same sort can be constructed, which will enable the observer to use both eyes at once and to view a larger field.

This skiascope is very useful as a means of testing the behavior of the vacuum-tube. I have assumed that the vacuum-tube that affects the phosphorescent substance most vigorously will also act most vigorously on the photographic plate; all my experience is in harmony with this assumption, but I have as yet made no experiments to test it. Since slight changes in the performance of the inductorium will make considerable difference in the action of the vacuum-tube, it is convenient to have a test of proper action, such as can easily be made by this instrument.

This skiascope is obviously the instrument which is best adapted to the study of the physical questions connected with the Röntgen rays.

In describing this instrument as my own, I do not wish to be considered as asserting priority over Professor Salvioni, of Perugia, who has described an instrument essentially similar, but only independence in the invention.

In closing this account of the physical matters involved in our joint labors one or two isolated observations may be mentioned. In one case, when the photographic plate, which had been exposed to the Röntgen rays for over an hour, was taken from the plate-holder, the object—an arm and an elbow-joint—was seen by two photographers as a dark band across a light field. This seems to show that the sensitive film is phosphorescent and that the photographic effect is secondary. I have not as yet repeated this observation.

In the opinion of three observers the interposition of a thin plate of aluminum between the vacuum-tube and the fluorescent paper of the skiascope did not merely leave the fluores-

cence undiminished, but actually intensified it considerably. This effect was observed when the aluminum plate was first used. I tried to verify it later without success. I report it because the result was certain and because it may have some bearing on the success that has been obtained in rapid skiagraphy by those who have used aluminum covers for their plate-holders.

II.

IN SURGICAL DIAGNOSIS.

By W. W. KEEN, M.D., LL.D.,
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JEFFERSON MEDICAL COLLEGE, PHILADELPHIA.

The surgical cases that were examined by this method consisted of:

1. A burned hand with anchylosis of all the fingers at the knuckle-joints and some necrosis of the metacarpal bones, which were in great part soldered together, the little finger being curved under the ring-finger. The skiagraph shows well the bones in the fingers. In the metacarpus, the reason for the fusing of nearly all the picture is that the bones, as a consequence of the very severe burn between the rollers of a heated mangle, were completely soldered together in one mass. The little finger, even where it passes under the ring-finger, is well seen.

2. A tubercular elbow-joint in a child of twelve years, in which not only the humerus is shown, but also the radius and ulna.

3. The elbow-joint of a young man of twenty years, who, twelve years ago, fell, striking his olecranon violently on a bit of railroad iron, driving the ulna into the groove between the two condyles of the humerus and wedging them apart. The condyles, especially the inner, show well; the radius and ulna were in such contact as to appear only as one. Strange to say, flexion and extension were excellent.

4. An elbow which had been resected for tubercular disease a few days before. This was in plaster-of-Paris splints encasing respectively the arm and the forearm, with a bar of iron

extending between the two in order to fix the elbow rigidly. The skiagraph shows the plaster-of-Paris splint and the iron cross-bar. It is to be observed that the plaster is opaque to the rays, while on the contrary the gauze-dressing and the bandages which thickly encased the elbow and the bar were translucent to them. The ends of the resected bones of the fore-arm show only very faintly, and the end of the humerus also, probably (as the bar shows) from the movements of the child or some modification of the rays by the dressing and bandages.

5. A shoulder-joint with a recent resection of about three inches of the humerus, on account of an old dislocation with fracture of the surgical neck followed by a late osteomyelitis. This picture was also taken without removing the bandage and dressing, by fastening the sensitized plate in its holder immediately behind the shoulder, while the Crookes's tube was placed in front of the shoulder, the patient lying sidewise in a bed. The skiagraph shows the outline of the edge of the scapula only; presumably the parts were too thick. Another difficulty was the constant respiratory movement, which has aided in blurring the outlines.

6. I attempted to skiagraph the trephine-opening in a case operated on four years ago, but, though the sensitized plate was left exposed for somewhat over an hour, no picture whatever appeared upon it. Whether this was due to a defect in the plate or in the tubes, or whether, as it seems to me more likely, to the impossibility at present to skiagraph through even one thickness of the skull, I do not know. The patient lay upon a bed with her head resting on a sensitized plate, the trephine-opening being next the plate and the Crookes's tube on the opposite side of the head. The head was not shaven.

7. Shows a hand of an uninjected cadaver. In it is observed not only the bones and cartilaginous extremities, but also in the thumb the sesamoid bones. A needle was thrust into the thumb up to its eye. This foreign and more opaque body comes out much more sharply than do the bones. Under the metacarpal bones of the fore and middle fingers are seen

two large buckshot. These were inserted on the palmar surface of the hand, and are, therefore, seen through the bones. The skiagraph shows an enlargement of the head of the metacarpal bone of the thumb, which was found, by subsequent dissection, to be the result of an old injury.

We were anxious, also, at the ingenious suggestion of Mr. Arthur H. Lea, to see whether the hand of a dead person would act differently from the hand of a living person in intercepting the passage of the Röntgen rays, in order that it might be used as a test of death, but, so far as we can judge, no such difference appears.

8. The following specimens of bacteria were exposed to the rays in order to test their effect on the bacteria, namely: pink streptococcus, anthrax, micrococcus prodigiosus, micrococcus cereus flavus, sarcina aurantiaca, yellow sarcine, tubercle-bacillus, for first thirty minutes, and then twice for fifteen minutes. In order to prevent the unfavorable effect of the glass tubes, they were so placed that the rays reached the bacteria through the cotton stopper. The tube of tubercle-bacilli was exposed sidewise through the glass, and not lengthwise through the cotton, for one hour. Dr. Kyle reported that inoculation showed a good, strong growth from all of them. No lethal or even inhibitory effect was therefore seemingly produced upon these bacteria by an hour's exposure to the rays.

Clinical Conclusions. The above facts, together with other reports in various medical and lay journals, show clearly that the thinner portions of the body can be skiagraphed with considerable accuracy. This is true of parts of the body as thick as an ordinary elbow. Whether it will be true of the thicker parts of the body, *e. g.*, shoulder and trunk, is doubtful with present methods.

The effect of doubling the thickness through which the rays pass is admirably shown in the skiagraph of a foot in the *British Medical Journal*, February 8, 1896. Where two toes overlapped the skiagraph is twice as dark as where it was taken through a single toe.

One of the difficulties we have had has been the length of time necessary to take the picture. The shortest exposure in any of these has been twenty minutes with extra quick plates made especially for us by Mr. Carbutt. We observe in the newspapers that it has been stated that instantaneous pictures have been lately taken by Edison and others. If this be so, it will aid materially in getting better defined pictures both by relieving the patient of the irksomeness and even impossibility of remaining absolutely still for so long a time, as in the old daguerreotype, and by obviating the blurring consequent upon respiratory movements of the chest and the abdomen. The skiagraph of five years hence will be as superior to such as we present herewith as our present photographs are superior to those of forty years ago.

To sum up the clinical results obtained by ourselves and others, it is evident that of the *normal structures of the body* it would seem that all are permeable to the rays except the bones, and, therefore, it is not very probable, at least with our present methods, that we can determine much about them, although in the *British Medical Journal*, February 8, 1896, Mr. Sidney Rowland states that Adolph and Lenz, of Elberfeld, have been able to get pictures of *connective tissue.*

The *bones* are opaque to the rays, hence deformities, injuries, and diseases of bone will be more or less amenable to diagnosis by this method. The best illustration of this that we have seen is the case reported and figured in the *British Medical Journal*, already alluded to. In this case the distal phalanx of the great toe appeared to be double, as though there were two bones in the last joint. There was difficulty in distinguishing which of the two bones was the normal phalanx and which the supernumerary. Prof. Mosetig, therefore, took a skiagraph and was able instantly to determine which was the normal and which the abnormal phalanx.

We shall probably be able to differentiate *fracture* and *dislocation* even possibly in the thicker parts of the body when our methods have become more perfect. As has been pointed out in *The Medical News* of February 22, 1896, this may be of

much use in obscure cases with great swelling, for the swelling is not impermeable to the rays. Suspected greenstick fractures can be made evident, and in any case in which possibly a claim for malpractice would be made, if, after the bones are adjusted, they were skiagrapned through the dressings, including even the ordinary board splint (plaster, of course, would not do), such a skiagraph might be of great value in court. Even if not needed for such medico-legal purposes, it would be of value to the surgeon in assuring him that everything is in proper order. *Exostoses and bony tumors* of any kind can thus undoubtedly be diagnosticated. *Cartilage* is translucent to the rays.

Gall-stones have been skiagraphed outside of the body (but not yet in the living body) by Neusser, Goodspeed, and Cattell (*The Medical News*, February 15, 1896, p. 169), but although only obscured by the thickness of the wall of the bowel into which the gall-stone had been thrust, no diagnosis could have been made from it. If we did not know a gall-stone was there we could not have guessed it.

Phosphatic and probably other *urinary calculi* Neusser has shown to be quite impenetrable to Röntgen rays (as would be suspected by the impermeability of plaster-of-Paris), but it is very doubtful whether we will be able to utilize them in diagnosis, on account of the bladder lying in the pelvic basin, the bones of which would cut off the rays. The kidneys at present cannot be skiagraphed, as the rays will not pass through so thick a part of the body. *Renal calculi* are as yet beyond our diagnosis by this method.

It is very doubtful also whether our diagnosis of *tumors* will be much aided by this new method, excepting in cases of bony tumors. Other tumors seem to be as translucent to the rays as the soft parts of the body. In tumors of the brain, the bones of the head (especially as the rays would have to penetrate *two* thicknesses of bone) will absolutely preclude any use of this method in diagnosis.

All such statements as the above apply, of course, only to our present knowledge. It is not only possible, but very prob-

able, that we shall be able to accomplish very much more by the improvements which will be introduced into the method within the next few years.

Probably the most important use of the method will be in the location of *foreign bodies.* While some metals are translucent to the rays, others, and fortunately the common foreign bodies, are not translucent; thus in a plate of a dead hand, a *needle* thrust into the soft parts of the thumb shows with such striking clearness that we may positively say that, if a needle is suspected to exist in *any* part of the hand (and very often the history is obscure, so that we are doubtful whether the needle is really in the hand or not), by means of the Röntgen rays we can positively determine its existence and location.

The same skiagraph shows two *buckshot* which were placed purposely in the palm of the dead hand, and they are clearly seen even through the metacarpal bones. This method has actually been utilized already in several instances, according to the daily papers. Once by von Bergmann, in Berlin, Bury, of Chicago, and several others who have been able to find bullets and shot believed to be imbedded for a long while in the body. It is almost needless to add, as von Bergmann has pointed out, that most of such missiles, if they are quiescent, would be better utilized as phenomena than removed.

Fortunately, also, *glass* is very opaque to the rays, and if the hand is cut by glass, the existence of any pieces which might otherwise be overlooked can be disclosed by the Röntgen rays. One peculiar advantage of the method also is this: A hand supposed still to have a fragment of glass in it can be skiagraphed without removing the dressings even though they be moderately thick, as both gauze and bandage are permeable to the Röntgen rays. Thus an elbow was taken while covered with the ordinary voluminous surgical dressings.

The hand from which another plate was taken is that of a patient, a young colored woman, who had suffered amputation of the third finger some months previously. There remains a very sensitive condition of the stump, and at one point a small area exquisitely painful to pressure. The skiagraph was under-

taken to determine the condition of the end of the bone, to ascertain whether an enlarged nerve-end would give a shadow to the rays, and to secure any information leading to a choice of operative procedures for relief. The patient was brought for examination by Dr. Stricker Coles, to whom she had come for treatment. An examination of the end of the finger will show upon its ulnar aspect a slight enlargement of the tissues next the bone. No distinct enlargement of the nerve is visible by this method of inspection. This skiagraph was taken with an exposure of one hour without the use of the lead diaphragm and with the Crookes's tube a distance about fifteen inches from the hand. The plate is interesting for its clear delineation of the wrist. In view of the fact that no one point at the end of the stump could be demonstrated to be in a pathological condition capable of cure by operation, the patient was advised to submit to amputation of the metacarpal bone.

III.

THE STUDY OF THE INFANT'S BODY AND OF THE PREGNANT WOMB BY THE RÖNTGEN RAYS.

By EDWARD P. DAVIS, A.M., M.D.,
CLINICAL PROFESSOR OF OBSTETRICS IN THE JEFFERSON MEDICAL COLLEGE, ETC.

The body of the infant and pregnant womb present conditions alike favorable and unfavorable for investigation by this method. The body of the infant contains a skeleton so much less completely ossified than that of the adult that it is scarcely to be expected that the same clear shadows can be obtained with the apparatus at present at our command. The problem naturally presents itself, Can the skeleton of the fœtus be recognized by this method within the mother's womb? To ascertain the relative density of the pelvis and fœtal skull to the rays, the following experiments were undertaken:

The skull of an infant at term was placed in a female bony pelvis upon a sensitized plate completely sealed in a pasteboard box. The pelvis was placed in such a position that it rested upon the plate upon the tuberosities of the ischia and the coccyx. The skull was laid obliquely in the pelvis. To secure as much definition as possible a lead diaphragm was interposed between the tube and the pelvis. An exposure of one and one-half hours was made to test thoroughly the various portions of the skull and pelvis subjected to the rays. The result shows that the greater portion of the fœtal skull gives but a very faint shadow under the action of these rays. The base of the skull is darker, while the temporal region scarcely gives a reaction. In marked contrast to this is seen the black coccyx, which rested upon the plate, and also the rami of the pubes and the spines of the ischia.

A further test was made of the permeability of the fœtal skull by placing the skull upon its parietal surface upon a sensitized plate, and by dropping into it two buckshot, which rested upon the lower parietal bone. In order to reproduce these shot the rays traversed both sides of the fœtal skull An exposure of one hour was made, with the use of the lead diaphragm. The result again showed the transparency of the temporal portion of the skull, and the fact that the lead bullets are clearly seen through the skull. It was next determined to investigate the action of the rays upon the bones of the fœtal skeleton. To ascertain this the skiascope of Magie was employed with direct inspection. In a darkened room, and with the head of the observer covered by a camera-cloth, the foot of an infant three days old, born at term, was held against the skiascope, exposed to the rays of the tube. The bones of the tarsus and the metatarsus and the outline of the foot were readily seen by three observers. The knee of the same child was next investigated in the same manner, and a sketch made of what was seen. Here it was observed that the cartilaginous portions of the joint offer no shadow by the passage of the rays.

The skull of the infant was next turned, with its temporal region toward the tube, and an effort made to appreciate the passage of the rays through the skull by direct inspection with the skiascope. Here again the temporal region and the brain gave no shadow upon inspection. Upon moving the instrument toward the orbital plate the outline of the border of the orbit and the eyeball appeared. This led to the question as to the permeability of the eye to these rays. Dr. G. E. de Schweinitz very kindly subjected a pig's eye to direct inspection with the skiascope, and found that the eye does not cast so deep a shadow as do the adult bones, but that the eyeball does not transmit the rays as do the soft portions of the body. The eye was inspected in its longitudinal axis, and also transversely. When the rays pass longitudinally the eye seemed more permeable than when the rays traverse the sclerotic. To test further this question, Dr. de Schweinitz sent me two bullock's eyes, of which a skiagraph was taken

by direct exposure to the rays for half an hour. A considerable mass of fat and connective tissue was adherent to the eyes, as they had been removed at the slaughter-house and had not been dissected. It was observed that this fatty tissue is much more permeable than the eyeball.

The direct inspection of the trunk of the fœtus with the skiascope revealed the fact that the rays permeate the trunk of the newborn child with facility, but that the skeleton casts but a faint shadow. It was possible to appreciate by direct inspection the passage of the rays through the body of a child weighing five and a half pounds, three days old, and born in the ninth month of gestation. The infant was held with its back toward the tube, while the skiascope was applied directly to the chest. The infant's body was not exposed, but remained covered by two thicknesses of light flannel. It was impossible, however, to outline the skeleton clearly or to observe movement in the internal organs.

An investigation of the trunk of the infant by passing the rays directly through the body of the child to a sensitized plate resulted in a very interesting demonstration; the child was clothed in two flannel garments, making four thicknesses which the rays permeated. The umbilical cord had not separated, and at the umbilicus there was a considerable area of granulating tissue with a slight extravasation of blood, occasioned by pulling upon the cord when the belly-band was taken off for the inspection of the child. The stump of cord remained wrapped in its dressing of aseptic cotton. The child was bandaged upon a sensitized plate, with its back toward the plate, very much as the Indian papoose is fastened to its board. The bandage was the ordinary surgical roller, and entirely covered the trunk of the child's body. It was then exposed to the direct action of the rays, the tube being ten inches from the body, for forty-five minutes. The child remained quiet, did not seem annoyed by the crackling of the tube, and experienced no apparent discomfort. The plate shows the faint outline of the ribs, a dark shadow given by the sternum and underlying spinal column, a trace of the vertebral

column, dark shadows cast by the crests of the ilia upon each side, and a shadow given by the stump of umbilical cord, which lay obliquely across the body toward the right, and by the granulating tissue at the umbilicus. The shorter exposure was made in this case from the belief that in very permeable objects too great an exposure may result in losing an outline which could otherwise be obtained.

The attempt to secure a skiagraph of the fœtus *in utero* was naturally attended with great difficulty. The usual timidity of pregnant women, the difficulty which a pregnant patient experiences in sitting or lying in a fixed position, the thickness of the tissue to be permeated, the respiratory movements of the mother, and the fœtal movements, necessarily complicated the experiment. A previous attempt had been made to secure an outline of the spinal column in an adult man, with an exposure of two hours. A newly invented sensitized plate was used for this experiment, with a negative result. A similar plate was employed in the case of a girl, aged eighteen years, pregnant eight and a half months, her fœtus occupying the usual position in the womb. She was placed in a comfortable position upon a clinical table, the abdomen covered with a sheet, and the patient attended by a nurse. A sensitized plate recently devised by Carbutt was placed against the abdomen upon the patient's left side. The lead diaphragm was interposed between the Crookes's tube and the right side of the patient's body, and any danger of the transmission of shock to the patient was obviated by connecting the diaphragm with a gas-fixture. The tube was placed vertically, and the patient subjected to the action of the rays for one hour. The plate was uniformly acted upon by the rays, but without definition.

A second attempt was made with the same patient, using the Eclipse plates, which we have found most successful, without the use of the lead diaphragm, and with an exposure of one hour and fifteen minutes. It was interesting to observe on both occasions that the proximity of the electric apparatus seemed to have no perturbing effect upon the patient. She was informed that an effort would be made to ascertain the

position of the child by the use of the electric light; she readily consented to the attempt, and, aside from slight fatigue from remaining quiet in one position, she seemed rather to be soothed by the constant sound of the apparatus, her pulse not varying through the entire time. The result of this second effort to investigate the pregnant uterus shows a difference in the permeability of the fœtal body and limbs from that of the uterine wall and amniotic liquid. By reference to the negative it was seen that the faint outline of the trunk of the fœtus could be recognized, the darker shadow of its pelvis occupying the upper right-hand portion of the plate, while projecting downward at about the centre were irregular white masses showing the situation of the fœtal limbs. The head of the child was so hidden by the mother's pelvis that no definite indication of its presence was obtained. While this experiment failed to outline distinctly the skeleton of the fœtus, it offers information which may be of value in further attempts. There has not been the slightest evidence that the passage of the rays through the uterus has affected either mother or child.

From our study of the pelvis and skull, and from our investigation of the living patient, it seems probable that information of practical value regarding the position and attitude of the fœtus may be obtained with the future development of this method. It seems probable that the contour of contracted pelves may also be recognized in future. An abnormal condition of the fœtus, such as a tumor, or an accumulation of fluid within a cavity of the fœtal body, might be recognized by the abnormal contour of the tissues. The presence of more than one fœtus in the uterus could possibly be appreciated. That a distinct outline of the individual parts of the fœtal skeleton is to be obtained seems scarcely probable with our present knowledge and the apparatus at present at our disposal. The attempt to obtain information by this method is certainly a justifiable one, as it requires no exposure of the patient, no vaginal manipulation, and puts her to no essential discomfort.

In concluding our account of these studies there are some general observations which may prove of value to clinicians in

adopting this method. From Magie's description of the apparatus, it is evident that a well-equipped hospital, lighted by electricity, can readily add to its resources a clinic-room for this investigation. The ten patients whom we examined experienced no discomfort during the application of this process. Where the hand is to be examined, the patient is most readily accommodated in a comfortable chair, with the hand resting upon a table. Where a child's limb is to be investigated, it is best to lay the child upon a comfortable table, and to bandage the sensitized plate upon the limb. We find that surgical dressings, cotton, and the ordinary bandage interpose no essential obstacle to the passage of the rays. The four children subjected to examination by this method gave us no trouble by restlessness, and, after the first crackling noise of the apparatus became familiar, were not in the least disturbed. This method can be readily applied to bedridden patients. It would be necessary to secure a proper holder for the Crookes's tube, so jointed that the tube can be raised or lowered and extended over the body. The patient could be brought to the examining-room in his bed, the sensitized plate bandaged upon the portion of his body to be examined, and the tube suitably adjusted. The services of a practical electrician and of an expert photographer are necessary for the application of this method.[1] The electric current can be obtained from the Edison Lighting Company, and an additional apparatus could be supplied by the hospital. As dry plates are used, the photographer's apparatus need not be elaborate. A small dark-room adjacent to the clinic-room would be required, with running water.

By the use of the skiascope at the present stage of our knowledge the fingers and hands are open to limited investigation. During these studies we had occasion repeatedly to examine the bones in our fingers, and to recognize the metacarpal bones. It was also possible to observe the rays coming between the radius and ulna by looking directly through the

[1] We desire to express our obligation to Walker & Kepler, electricians, and especially to Messrs. George Teffeau and Redmond, for their kind and efficient assistance in this investigation. We are also greatly indebted to Mr. F. E. Manning and to Mr. John F. Reese, photographer, for constant and intelligent work with us.

arm, and to observe the penetration of the rays behind the trachea by placing the skiascope just behind the larynx. A more extended application of this method depends upon chemical and physical research as outlined by Magie.

It is evident, however, that at present we may obtain by this method valuable information regarding the terminal portions of the sketeton and regarding the contour of various portions of the body. The presence of metallic substances in the body may be demonstrated. It remains for physical laboratories to furnish the clinician with improved apparatus for the further application of this method of clinical research. It remains for the physiologist to supply us with indices to the permeability of the various normal tissues of the body, and for the pathologist to furnish us similar information regarding the effect of the rays upon diseased tissues. So far as our observation goes bacteria exposed to the action of the rays are not influenced by them.

THE PRESENTATION OF AN UNUSUAL TEMPERATURE-CHART.

By CHARLES B. PENROSE, M.D.,
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[Read April 1, 1896.]

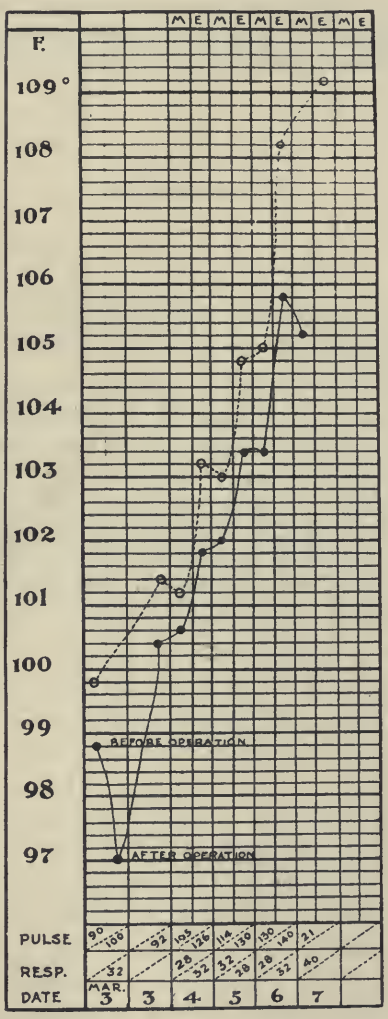
I PRESENT the following very brief report of this case on account of the unusual range of temperature which was exhibited. The patient was a white woman, aged thirty-one years, single. She had suffered for two years with fibroid tumor of the uterus which, when she first came under my observation, on the first of last March, was about the size of an adult head. She had had a chronic cough for the past two years, with a slight mucous expectoration. She was a strong, well-nourished woman, who supported herself as child's nurse. She had a well-marked phthisical family history, her mother and several brothers having died of pulmonary tuberculosis.

On March 3, 1896, the abdominal tumor was removed by cœliotomy, the uterus being amputated at the internal os, the stump being treated intraperitoneally in the usual way. The temperature immediately before operation was, as will be seen by the chart, $98\frac{4}{5}°$ by mouth and $99\frac{4}{5}°$ by rectum; immediately after the operation the temperature registered 97°. I will briefly give the history during the four days which she lived.

During the first twenty-four hours after the operation she was unusually comfortable, complaining very much less of pain than is usual after such operations. She had, however, an annoying cough, without expectoration. The quantity of urine secreted during the first twenty-four hours was $16\frac{1}{2}$ ounces, a somewhat larger amount than is usual. The second twenty-four hours the cough continued; the abdomen was flat; there was no abdominal pain whatever; flatus was passed freely. Quantity of urine 13 ounces. The third twenty-four hours cough continued as before, with no expectoration. She complained of headache. The bowels were freely moved. There was no abdominal distention or pain. Urine 20 ounces. The fourth twenty-four hours the cough continued. There was one expectoration of rusty sputum of pneumonic appearance. Examination of the lungs revealed no local signs of pulmonary trouble. There was no pain whatever in the chest; in fact, dur-

ing the whole time this woman maintained that she was comfortable in every respect, and felt that she was doing well.

She died ninety-two hours after the operation. Eight hours before death she became somewhat stupid and sluggish, and about this time 12 ounces of



blood was taken by wet-cups from the posterior aspect of the chest. Six hours before death she was slightly restless. She retained consciousness

until the end. She at no time had any paralysis, and the headache of which she complained during the third twenty-four hours after operation was but slightly marked. As will be seen from the chart, the temperature continued to rise steadily. The solid lines indicate temperature by mouth, the dotted line temperature by rectum. Highest temperature registered 109⅕°, by rectum, was taken after the heart had ceased beating.

Post-mortem examination of chest and abdomen was negative beyond slight general pulmonary congestion. Examination of the brain was not permitted.

DISCUSSION.

Dr. F. P. Henry: What was the maximum temperature recorded in the case?

Dr. Penrose: The highest point noted was 109⅕°.

Dr. Henry: Dr. Jacobi reported a case at Washington last year in which the temperature reached 148°.

Dr. A. A. Eshner: There is one question which the high temperature in the case reported brings up, and that is the possibility of infection. The temperature-chart recalls that often seen in the last stages of tetanus and of hydrophobia, although there seems to be no suspicion of either in this case. It is noted that the last temperature was taken shortly after the heart had ceased to beat. It would be of interest to know if the temperature continued to rise for some time after death. Analogy suggests that there may have been some obscure infection or intoxication acting especially upon the heat-regulating mechanism.

SUPPRESSION OF URINE OF LONG STANDING WITHOUT SYMPTOMS OF URÆMIA.

By WHARTON SINKLER, M.D.

[Read April 1, 1896.]

It would seem at first thought that complete anuria would inevitably be followed within a day or two by decided uræmic symptoms. This, however, is not the case, except in those instances in which diseased kidneys have been gradually excreting less and less urine, so that urea and other excrementitious products have been steadily accumulating in the economy. In such cases, when complete suppression occurs, the patient falls speedily into a state of uræmia. In hysteria suppression of urine is not an unusual symptom, and the length of time during which no urine is voided varies from days to even weeks. In hysterical anuria there are no symptoms of uræmic poisoning, and the explanation may be found in the fact that tolerance is established through the supplementary secretions from other organs—the skin, lungs, and intestinal tract.

Complete anuria may result from a variety of causes, and it is interesting to note that when it occurs there is, frequently, not occlusion of both ureters, or even disease of both kidneys. Spallitta[1] has experimentally produced total anuria in dogs by ligating one ureter, and he regards the arrested action in the other kidney as a reflex phenomenon. This is probably occasioned by vaso-constriction of the renal vessels induced by a

[1] La Sicilia Medica, No. 1.

lesion of the splanchnic nerve. The most frequent causes of suppression of urine are calculi blocking the ureters, malignant disease causing obstruction of the ureter by pressure or otherwise, scarlet fever, diseases of the kidneys, such as abscesses and cystic degeneration, and hysteria. Among the rarer causes are mercurial or cantharides poisoning, cholera, measles, and diphtheria.

A considerable number of cases of complete anuria have been reported in which the suppression lasted for periods varying from four days to two months. A case in which anuria persisted for two months was reported by Dr. Bailey.[1]

The patient was a girl, aged thirteen years, an inmate of an orphanage. When first seen the child was vomiting continually, and the urine had been scant for a few days. On October 10th no urine was passed, and there was complete suppression from this time until December 12th, when eight ounces were passed. During this interval there was continual vomiting. From December 12th until February 1st there was again an interval of total anuria, and eight ounces were again voided. Another period of suppression followed, lasting until March 1st, when the patient passed a small quantity of urine, and then scant but regular secretion followed. The patient finally recovered. The vomiting was so persistent that the child had to be fed by the bowel, and she became much emaciated. The doctor who reports the case says that the child was carefully observed during the whole time, but the case is so extraordinary that one cannot help thinking that there was some deception.

In suppression of urine from obstruction the patient, as a rule, does not appear at first to be ill, and uræmic symptoms may not develop for a week. Death generally ensues after twelve days.

It has been my fortune to see two cases of complete suppression of urine, one lasting six and the other nine and a half days. The first case I reported in the *American Supplement of the Obstetrical Journal of Great Britain and Ireland*, December, 1878.

The patient was a child, aged four years, who had just recovered from an attack of scarlatina. For a few days there had been a slight diminution in

[1] Charlotte Medical Journal, 1895.

the amount of urine passed, but on the day before I saw her she seemed as well as usual. On the following morning she passed one-half ounce of clear blood from the bladder. Four days later two ounces of thick bloody urine were passed. Nothing more was passed from the bladder until the morning of the sixth day, when four ounces of clear urine were voided. This urine contained about one-third albumin, and under the microscope blood, granular and hyaline casts were seen in large numbers. The patient made a rapid recovery after this, and is now living—a strong and healthy young woman.

During the six and a half days in which there was suppression of urine there was no evidence of uræmia. The patient was bright and happy most of the time, and slept quietly and without stertor. The bowels were kept loose, and the skin was made to act freely by vapor baths and diaphoretics.

The other case was Miss A. B., aged sixty-three years, who consulted me early in December, 1894. She stated that she had always enjoyed good health, with the exception of an attack of ptomaïne-poisoning from eating cream-puffs three or four years before. She was quite ill at the time, and for several months suffered ill-effects from the poisoning. For seven years she has had more or less pain in the left hypochondrium, but it was not severe enough to cause much annoyance. Six months before seeing me the pain increased in severity. It was dull, and more or less constant, and never acute or paroxysmal. It was attributed to indigestion, and remedies had been given with a view of relieving gastric symptoms. She had a good family history, and was a well-preserved woman for her age, with a good color, and was well nourished. She had lived in a malarious region, but there was no distinct history of intermittent fever. The menopause occurred at fifty years.

An examination showed no swelling or tenderness in the region in which she complained of pain. There was some distention with gas, but this was not excessive. Her bowels were regular, and her appetite fairly good. There was some discomfort after eating, and there was usually more pain in the left hypochondrium after a meal than before. There was no bladder irritability. I asked for a specimen of urine, and when it was obtained the patient expressed surprise at its appearance. It was dark-red, evidently containing a large quantity of blood. The patient declared that she had never before observed any evidence of blood in the urine. On examination it gave the following results: Specific gravity 1030; acid; no sugar; albumin one-eighth of the volume.

Under the microscope there were found epithelium, mucus and pus, and blood-cells in large quantities. There were uric-acid crystals and urates, but no casts were detected. The urine was examined at intervals of four or five days, and on each occasion a greater or less quantity of blood was found

present until February, 12, 1895, when the specimen examined was of normal color, specific gravity 1018, and merely a trace of albumin. Under the microscope a few blood-cells were found. The patient at this time was very much better, although she had occasional attacks of pain and was weak. She had become quite pallid, and, while there was no severe pain, she often had attacks of pain in the left hypochondrium. No relation could be traced between the attacks of pain and the hæmaturia. The diagnosis of renal calculus was made at this time, and it seemed that the stone was loose in the pelvis of the kidney and was probably too large to engage in the ureter, hence the absence of acute pain. The patient went South, and soon after her arrival at her destination caught quite a severe cold. She had more or less fever each day, and a troublesome cough. About the middle of March, 1895, she was seized with severe pain in the right iliac fossa. This was accompanied with attacks of retching, vomiting, and diarrhœa. Owing to the attacks of severe pain and disturbance of the stomach the patient lost much rest at night, and was able to take but little nourishment. She returned to Philadelphia on March 24, 1895.

When seen by me she was rather sallow, the tongue was coated, and there was considerable complaint of pain in the right iliac fossa. Careful examination of the abdomen discovered no tumor or induration, and no marked tenderness could be elicited in the right iliac fossa. She still complained of pain in the left hypochondrium, but this was not as severe as the pain upon the right side. The patient's expression was rather anxious, and she slept badly. She was able to take but little nourishment on account of the irritability of the stomach, and the bowels moved only with laxatives. The tongue was coated and the breath very offensive. The urine, on March 31st, was clear, but there was a heavy sediment, with a brick-dust deposit; specific gravity 1021, no sugar, large ring of albumin with acid. Under the microscope epithelium, pus, numerous red blood-cells, and uric acid were found; no casts. April 2d, the urine was again bloody, heavy sediment, and a large quantity of albumin was present. Under the microscope many red blood-cells were seen, and some doubtful casts.

Having some doubt as to the cause of the pain in the right iliac fossa, and thinking it possible that there might be some disease of the appendix, I asked Dr. H. R. Wharton to see the patient with me in consultation. He decided that there was no disease of the appendix. A day or two later Dr. William Pepper was kind enough to see the patient with me, and made a careful examination, and coincided with my diagnosis of renal calculus.

From this time both Dr. Pepper and Dr. Wharton saw the case with me, and subsequently, during my absence after May 8th, took charge.

The amount of urine passed was normal until April 16th. At 6 A.M. on this day she passed the usual quantity of urine. At 2 P.M. she complained of much pain in the right iliac fossa, and, being unable to pass urine, hot fomentations were applied over the bladder every few minutes. Infusion of

digitalis, one-half ounce, was ordered every four hours, and Poland water was given freely, but with no effect upon the secretion of urine. The catheter was passed and the bladder found empty. The amount of nourishment had to be very limited on account of the vomiting. From this time until April 25th no urine was passed, with the exception of a few drops of fluid, which were drawn with a catheter on April 20th. This fluid amounted to about one-half drachm, was pale, and had no urinous odor, and was evidently a secretion of the bladder. On the 24th sixteen drachms of fluid were drawn by the catheter. This fluid was of a milky-white color, with an odor like that of a mucous discharge; the specific gravity was 1010, acid, and there was no sugar. One-third of the entire bulk was albumin. There was a heavy white sediment, which, under the microscope was found to consist of pus, mucus, bladder and vaginal epithelial cells. There were no small cells from the kidneys or ureters. There were no casts found, and no crystals of any kind could be detected. It was, therefore, clear that this fluid was not urine. At 8.45 A.M., on the 25th, a catheter was passed without any result.

At 1.50 P.M., on this day (nine days and seven hours after the last urine had been passed), sixteen and a half ounces of urine were drawn by the catheter. An examination of a specimen of this urine gave the following results: Light color; specific gravity, 1010; acid; slight trace of albumin; 1 per cent. of urea. Under the microscope epithelium, mucus, and pus in large quantities were found. No blood-cells and no casts could be detected.

At 6 30 P.M. the patient voided urine in bed. The amount was about eight ounces. At 8 P.M. eight ounces were passed voluntarily, and at 12 P.M. eight ounces more passed, making a total of forty and a half ounces passed in ten hours.

During the nine days in which there was complete suppression of urine there was not the slightest evidence of uræmia. The patient's mind was clear, and there was no headache or somnolence. She slept badly and for short periods. The stomach was very irritable, and most of the nourishment taken was vomited. The bowels were loose, and from two to four liquid stools were passed in the twenty-four hours. The skin was not unusually active. There was no urinous odor about the patient.

The treatment consisted in digitalis by the mouth, and poultices of digitalis leaves over the loins. Sparteine and the mild chloride of mercury were also administered. On the fourth day two hypodermic injections of pilocarpine, one-eighth of a grain each, were administered. This caused free sweating, and seemed to make the patient more comfortable. After this there was less vomiting, and the patient took more nourishment. On April 24th two hypodermic injections of sparteine were administered, one-fourth of a grain each. During the period of anuria the patient complained of very little discomfort, and seemed to suffer less severe pain than she had done previously.

The amount of urine passed after April 25th, when the urine began to be

evacuated voluntarily, was from sixty to twenty-five ounces a day. The patient began to improve in strength, took more nourishment, and began to take some solid food. She slept badly and complained of more or less discomfort in the left hypochondrium. On the second day after the urine began to be passed freely the patient was in a peculiar mental condition. After a night of sound sleep she awakened in the morning and appeared unconscious of what she was doing. The right arm and leg appeared to be powerless, as the patient made no attempt to move them. She talked at random, and used wrong words for things. Several times she passed urine in bed, and appeared to be quite unconscious of it. It seemed as if she were in an hysterical condition, and if she were intentionally talking in a foolish way. This condition lasted two days, and after this time the patient became sensible and talked rationally, and moved the right arm and leg as well as she had ever done.

May 7th. Patient slept better, more comfortable, passed thirty-five ounces of urine.

8th. Passed twenty-four and a half ounces of urine.

From this time the patient's condition varied from day to day. On some days she was quite comfortable, and on others she suffered a considerable amount of pain in the abdomen. The urine continued to be passed to the amount of twenty-five to forty ounces each day. Occasionally the amount of urine passed was small, and on one occasion there were but eleven and a half ounces passed in twenty-four hours. On the whole, she gained steadily and materially. She became stronger. The digestion improved, and she took more or less solid food each day. During the end of the month of May the weather was intensely hot and the patient suffered greatly from the effects of the heat. On May 30th the thermometer in the room in which the patient was registered 93° F. The patient suffered, in consequence, a heat-stroke. She became unconscious for several hours, and then talked incoherently. The right arm and leg seemed paralyzed. She gradually sank, and died on June 2d.

POST-MORTEM BY DR. H. P. BOYER.

There was felt on palpation some fulness over left side of abdomen immediately above and to the left of the umbilicus. On incising the abdominal wall it was found very fat and the abdominal contents had much fat attached. The stomach, pancreas, spleen, and transverse colon were pushed upward and forward on the left side. The stomach, intestines, and pancreas were normal. The spleen was slightly enlarged, the liver normal. The left kidney was very tightly bound down. The peritoneum covering it anteriorly was very thick and tough. It extended up back of the pancreas nearly to the diaphragm, and its lower margin was fully as low as the sacro-iliac junction. On removal it weighed one and a half pounds. It was seven inches

long, including much fat in the capsule—six and a quarter inches long without the capsule. It was four and three-quarters inches broad at the centre and measured eleven and a quarter inches in circumference at its central portion. It was soft and flabby and would not retain its form if placed on a flat surface. Capsule thick, much fat in it, easily stripped off. In removing it many small abscess cavities were opened, from which a reddish pus ran freely. No cheesy material whatever found. These small abscesses studded the whole of the cortical portion—mostly on the external portion, fewer near the medulla; very few in the medullary portion. The abscesses were from the size of a large pin-head to three-fourths of an inch in diameter, but the whole organ seemed saturated with pus. There was one irregular stone in the lower part of pelvis of the organ, partly, but not completely shutting off the ureter. There were two other small stones found.

The right kidney was slightly enlarged, no abscesses in it, and no stones; otherwise seemed normal.

The ureters were not obstructed at any part of their course.

Microscopic section of the diseased left kidney showed the large size to be due to a round-celled sarcoma. There was very little kidney substance left, and many of the sarcoma cells were breaking down, which formed the multiple abscesses.

The length of time which a person can live without a kidney is quite remarkable, and this is shown in a case reported by Polk.[1] The patient was believed to have a floating kidney, and the organ was removed under this belief. It was found that it was a single unsymmetrical kidney, but the patient, notwithstanding its removal, lived eleven days.

Among the interesting cases of anuria of long standing with recovery is one reported by Adams.[2] A man suffered from suppression for nineteen days and recovered. Ostrander[3] records a case of a man who suffered from suppression of urine for eight days and recovered. Bernard[4] has also placed on record a case in which there was complete suppression of urine for twelve days, the patient making a good recovery without having had any uræmic symptoms. Ross[5] reports the case of a boy who had complete anuria for twelve days and recovered, showing during the period of anuria only mild uræmic symptoms. This case was probably malarious. Féréol[6] relates a

[1] New York Medical Journal, 1883.
[2] New England Medical Journal, 1884.
[3] New York Medical Journal, 1889.
[4] Dublin Journal of Medical Sciences, 1885.
[5] Medical Record, 1893.
[6] Le Progrès Médical, 1890.

case of total suppression lasting eight days in a gouty patient without any marked uræmic symptoms. The passage of a calculus about the size of a pea was followed by marked polyuria, and the patient recovered.

The surgical treatment of anuria from calculus is encouraging in its results. Demons and Pousson[1] have collected eighteen instances of operative interference in calculous anuria. Of these eighteen cases, six died. Legneu[2] reports a case of calculous anuria which had lasted for five days, and at this time nephrotomy was performed and a calculus plugging the ureter removed. The recovery was speedy. Hind[3] reports an operation for removal of calculus in a case of anuria which had lasted six days. The patient died at the end of fifty-eight hours from heart-failure. Bland Sutton[4] performed a nephrotomy, removing a stone from the entrance of the right ureter in a case in which complete suppression had lasted for five days. These are a few of the cases which are to be found in recent medical literature. With such a percentage of recoveries one should feel constrained to operate in all cases of calculous anuria.

In the case which I have just related the question of operation was seriously considered, but the patient's general condition did not seem to warrant the risk of an operation. The malignant disease of the kidney shows that operation would have been productive of but temporary relief.

Farlow,[5] in reporting a case of complete suppression, gives a summary of one hundred and twenty-five cases of suppression of urine, ninety-three of which were collected by E. P. Fowler and thirty-two by himself.

The following table contains a list of cases of suppression which have been published since the paper of the above author:

[1] Annals des Maladies des Organes Genito-Urinares, 1894.
[2] La Mercreti Médical, Paris, 1894.
[3] British Medical Journal, March 5, 1894.
[4] Medical Press and Circular, July 11, 1894.
[5] Boston Medical and Surgical Journal, 1889.

No.	Name of reporter.	Journal.	Duration.	Cause.	Uræmia.	Operation.	Termination.
1	Farlow,	Boston Med. and Surg. Jour.,1889.	12 days.	Pressure on ureters by fibrous mass in pelvis.	Uræmic symptoms and convulsions.	None.	Death; passed some urine before death.
2	Wilmot,	Brit. Med. Jour.,1883.	4 days.	Absence one kidney; stone in ureter of other.	None.	None.	Death from perinephritic abscess.
3	Adams,	New Eng. Med. Jour.. 1884.	19 days.	Not known.	No symptoms except œdema.	None.	Recovery.
4	Ostrander,	New York Med. Jour., 1887.	8 days.	Not known, but had previously had an attack of colic which may be due to stone.	None.	None.	Recovery.
5	Counsell,	Lancet, 1888.	5 days.	Thought that right ureter cut off previous attack, and now the left by a temporary calculus.	Drowsy only.	None.	Recovery.
6	Goodlee,	Lancet, 1887.	7 days.	Calculus blocking one ureter; nothing found on other side.	Not given.	None.	Death.
7	Bernard,	Dub. Jour. Med. Sci., 1885.	12 days.	None known.	None.	None.	Recovery.
8	Shroff,	Lancet, 1884.	9 days.	None known.	Slight uræmia.	None.	Recovery.
9	Turner,	Lancet, 1890.	3 days.	Calculi in each kidney.	Not given.	Removed stones from each kidney at one operation.	Passed urine for few days; relapsed and died.
10	Vernon,	Brit. Med. Jour. 1894.	4 days.	Kidneys diseased; three abscesses in one, with small calculus in ureter; very little healthy kidney substance in other one, and thus blocked.	Not given.	Yes.	Died after one week.
11	O'Hanlon,	New York Med. Rec., 1893.	10 days.	None known.	None.	None.	Died.
12	Ross,	Med. Rec., 1893.	12 days.	None known; had malaria.	Mild symptoms.	None.	Recovery.
13	Fraser,	Lancet, 1893.	5 days.	Not found at operation.	Mild; no convuls'ns.	Nephrotomy.	Recovery.
14	Cook,	Guy's Hosp. Rep., vol. xiv.	12 days.	Accident; rupture single kidney.	Died in coma.	None.	Died.
15	Poland,	Encyclop. of Surg., vol. v.	6 days.	Accident; thrombus renal vessels on one side, and rupture pelvis on other.	Not given.	None.	Died.
16	Butler,	Lancet, 1890.	13 days.	Blow in abdomen; atrophy of one kidney; thrombus in renal vessels and ureter of other side	Not given; probably none.	None.	Died of broncho-pneumonia.
17	Bailey,	Charlotte Med. Jour., 1895.	Oct. 10 to Dec. 12; Dec. 12 to Feb. 1; Feb. 1 to Mar. 1.	None known.	None.	None.	Recovery.

No.	Name of reporter.	Journal.	Duration.	Cause.	Uræmia.	Operation.	Termination.
18	Israel,	Deut. med. Wochen., Jan. 5, 1888.	5 days.	Calculus.	Not stated.	Nephrotomy; two calculi removed.	Death in nine days.
19	Lockwood,	Med. Rec., May 26, 1888.	9 days.	Calculus.	Not stated.	None.	Recovery.
20	Butler,	Lond. Lancet, Jan. 11, 1890.	13 days.	Blow on abdomen.	Not stated.	None.	Death.
21	Féréol,	Le Progrès Méd., 1890.	8 days.	Calculus.	None.	None.	Recovery; stone passed.
22	Carstens,	Physician and Surg., April, 1894.	11 days.	Obstruction from tumor.	Not stated.	None.	Death.
23	Kaefer,	Berliner klin. Woch., May, 1894.	8 days.	Calculus.	None.	None.	Recovery.
24	Sequen,	Le Bulletin Méd., July, 1894.	5 days.	Calculus.	Not stated.	Nephrotomy.	Recovery.
25	Hind,	Brit. Med. Jour., May, 1894.	6 days.	Calculus.	Not stated.	Nephrotomy.	Death.
26	Sutton,	Med. Press and Circ., July, 1894.	5 days.	Calculus.	Not stated.	Nephrotomy.	Recovery.
27	Eustace,	Brit. Med. Jour., Jan. 1896.	8 days complete; 20 days partial.	.....	None.	None.	Recovery.

DISCUSSION.

Dr. F. P. Henry: I was especially interested in the statement that one of the cases reported by Dr. Sinkler was complicated with paralysis. Paralysis, especially paraplegia, is by no means a rare complication of organic disease of the kidney.

There are certain contrasting facts observed in cases of obstructive and non-obstructive suppression of urine which, I think, afford a very plausible explanation of the clinical phenomena, or, rather, of the absence of clinical phenomena, in cases like that reported to-night by Dr. Sinkler.

Roberts was, I believe, the first to call attention to the fact that the symptoms of anuria from obstructive suppression are materially different from those of anuria from non-obstructive suppression. In the latter, which is usually the result of acute nephritis, poisoning by turpentine and cantharides and operations on the urethra, death from uræmia occurs, as a rule, within forty-eight hours; whereas, in obstructive suppression, death does not occur until after the lapse of many days, the average number being from nine to eleven. In other respects, besides the mere prolongation of life, there is also a decided difference between the symptoms of obstructive and non-obstructive suppression. In the latter there are the well-known

symptoms of acute uræmia, the most prominent being convulsions, delirium, and coma. In the former, coma and convulsions are rare, the patient often retaining his intelligence up to the last moments of life. The difference between the symptoms of these two forms of anuria has excited considerable attention, and is, perhaps, best explained by the theory that, "when there is healthy kidney substance with an active blood circulation through it, the waste products that should be excreted in the urine undergo some chemical changes that render them incapable of producing uræmia, notwithstanding that they are retained in the body."

The above-mentioned differences between the symptoms of obstructive and non-obstructive suppression are generally recognized. Exceptional cases are, however, occasionally encountered in which the rule formulated by Roberts is violated. Such an exception is to be found in one of the cases reported this evening by Dr. Sinkler, that in which the patient survived eleven days after excision of his solitary kidney.

Dr. J. P. Crozer Griffith: I had an opportunity recently of seeing a case which bears directly upon the subject of the report this evening. I have not the complete particulars in my mind, and I will speak of it now only briefly, as I want to report it in full at a future time. In January I was called in consultation to a neighboring New Jersey town to see an extremely interesting case of suppression of urine. Some weeks earlier he had nearly complete suppression for over six days. He recovered from this, but the day before I was called symptoms of suppression returned, and he passed only a very small amount of urine which was almost pure blood. He lived eight days after this without any headache or other uræmic symptoms. In fact, he said he felt perfectly well. He finally died of heart failure, and was perfectly conscious up to the end. During all the time of the sickness he on no day passed more than two or three teaspoonfuls of bloody urine. This is another instance in proof that a patient may live for many days with complete obstructive suppression, as by a calculus, and without the occurrence of uræmia. In this case the previous history pointed to the presence of a calculus in the right kidney, while there were also symptoms of chronic nephritis. The suppression reasonably seemed to be due to actual obstruction on the right side, with reflex suppression upon the other, as has been observed in other cases of renal calculus. The advisability of nephrotomy was considered, but was not performed on account of the presence of the nephritis and in view of the age of the patient.

Dr. Sinkler: In closing the discussion, I have only to add that the paralysis which occurs in kidney disease usually accompanies the uræmic state and seems to be dependent upon some brain-disturbance, the result of uræmia. The nervous symptoms in my case came on while the patient was passing a considerable quantity of urine, and was not uræmic, but the urine only contained 1 per cent. of urea.

ON THE HYPODERMIC USE OF IRON.

By J. M. Da COSTA, M.D., LL.D.

[Read April 1, 1896.]

For some years I have used, in certain cases, iron hypodermically. I have not employed it steadily owing to the difficulty of finding a stable, non-irritating preparation. After many trials, I think I have obtained this in one of the newer compounds, the ferrous manganese citrate, known also unofficinally as the ferri et mangani citras. I will cite some cases in which it was employed, and which illustrate at the same time its mode of usage.

Case I.—Thomas S., fifty-one years of age, a gardener by occupation, was admitted into the men's medical ward of the Pennsylvania Hospital on November 11, 1895, complaining of general weakness, with spells of faintness, during which consciousness remained. He had lost flesh, was anæmic, and had cardiac dyspnœa with palpitation after unusual exertion. An ulcer existed on the left leg just above the external malleolus. He declared himself to be temperate in the use of alcohol, and not to have smoked for fifteen years. Had typhoid fever when a young man. Venereal infection was denied; yet, about fifteen years ago, he had an eruption upon the chest-wall, anteriorly, and blood and pus came from the sores. Four years ago blood streamed from his mouth; the hemorrhage was accompanied by nausea. Subsequently two similar attacks happened, less severe than the first, the last one occurring two years ago. After the hemorrhages his skin began to blanch; later, the pallor increased, and he gradually became very weak.

On admission, the patient was seen to be a large man with a very pallid face; tongue pale and flabby; pupils normal; pulse 80, but with increased tension; temperature 98°; respiration 20. The whole region of the sternum, and on both sides of it, presented a mass of old cicatrices; the skin was closely attached to the sternum. The area of cardiac dulness was but slightly,

if at all, increased; the apex beat in the fifth interspace, eight centimetres from midsternum. At the apex there was a rough systolic murmur, transmitted to the axillary region, and heard, though feebly, over the pulmonary orifice; no accentuation of the second sound existed. At the aortic cartilage a well-marked systolic murmur was perceptible. In the cervical vessels a distinct, rough, systolic murmur was heard, and there was marked pulsation in the neck, especially upon the right side. The roughness of the murmur pointed to an organic origin. The lungs and the liver were normal; the spleen extended from the sixth interspace to the umbilicus (26½ cm.). The urine was acid, of specific gravity 1044, and contained neither albumin nor sugar; several pale granular casts and one epithelial cast, a few leucocytes, crystals of uric acid, and degenerated epithelium, were found. A blood-count showed red blood-corpuscles 2,184,000; white, 2666; the hæmoglobin was 19 per cent. The appetite was poor, and the bowels were constipated. The patellar tendon reflexes were absent, the biceps tendon-jerk was diminished, and no ankle-clonus existed.

November 21st, the patient was placed on full diet with meat and green vegetables, and on tincture of chloride of iron, fifteen minims every third hour, but by December 3d, though he was stronger and his general condition better, the heart murmurs were the same, and the blood, except for a slight increase of hæmoglobin, was but little changed. December 5th, a blood-examination demonstrated the red corpuscles to be 2,480,000, the white 2400, and the hæmoglobin 25 per cent. A hypodermic injection of citrate of iron and manganese, of three grains, was ordered to be given daily.

December 11th, temperature in the morning was normal, but in the afternoon, without any apparent reason, it rose suddenly to 104.6°. The general condition showed no alteration, nor was there any in the spleen or heart. The temperature reached 105.4°, and remained there for three hours, notwithstanding guaiacol externally and free cold sponging; it then fell steadily, and by the morning of the 13th was 98.6°. There were some râles at the base of the lungs, but no other changes.

On the 19th a blood-examination showed the red corpuscles to be 2,728,000; the hæmoglobin 25 per cent. The hypodermics of iron had been resumed.

On the 23d it was noted that the spleen was rather tender on palpation; pressure caused pain. The heart condition was not changed, except that the murmurs seemed less harsh.

From the 1st of January, 1896, there was a steady improvement. On January 18th he was allowed to get out of bed; his color was much better, and he spoke of feeling much stronger. Strychnine sulphate, one-fortieth of a grain three times daily, was added to the treatment. On the 22d, the red blood-corpuscles were 4,680,000, the hæmoglobin was 55 per cent., the color of the cheeks and lips was good; the patient said he felt well.

On February 7th the patient was going about the ward; he was beginning to look ruddy and to show a marked gain of flesh. The spleen, however,

exhibited no decided change; its outline was from the sixth rib in the axillary line to the costal margin, and thence to the umbilicus.

On February 22d the patient was discharged, after ninety-nine days in the hospital, feeling well and strong, and going back to work. The enlarged spleen remained, as did the cardiac murmurs. There was no obvious explanation of the sudden rise of temperature on December 11th and 12th, and it was not repeated; it occurred some hours after a hypodermic, but seemed to have no connection with it. The temperature fluctuated generally between 98° and 100°, being usually about a degree or a degree and a half higher in the afternoon than in the morning. At no time did the hypodermics cause pain or local inflammation, and, save the strychnine late in the case, they constituted the entire treatment. They were given in the legs and in the arms, and, except at first and for a few days during and after the fever outbreak, were administered daily. Finding himself steadily gaining, the patient became eager for their use. At first, only one hypodermic of three grains was every day resorted to; but toward the middle of the case two injections of three grains each were given daily, and, finally, two injections of five grains each. There was no sense of stimulation observed from the hypodermics.

Case II.—In a second case of enlarged spleen, in a young man of twenty-one, the same preparation of iron was used hypodermically. The man was admitted to the Pennsylvania Hospital on December 12, 1895, with marked anæmia connected with an enormously enlarged spleen, clearly of malarial origin. The spleen extended to the left inguinal region. The blood-count showed only 2,000,000 red corpuscles; the white blood-cells were 12,000 to the cubic centimetre; hæmoglobin was 34 per cent. In this case, also, marked improvement took place, though the treatment was not purely one by iron; quinine and ergot were also given. Nor was the iron used altogether hypodermically; it was at first, but, as on one occasion a slight cellulitis without abscess followed, it was afterward administered by the mouth. The injections never occasioned the least pain. The whole result of the treatment was very good. The blood condition strikingly improved. But, as in the preceding case, it is noteworthy that the spleen did not show a marked coincident diminution.

Case III.—In a third case of anæmia, also malarial, and aggravated by bleeding from the lower part of the bowel, the citrate of iron and manganese was also employed hypodermically in three-grain doses. It was given for fully a week, and never occasioned the least pain or disturbance. But, as the patient objected very much to the annoyance of any form of hypodermic medication, and as it was found that the remedy was well borne by the stomach, its hypodermic use was suspended. In this case, too, decided improvement occurred.

In every instance in which the iron was used subcutaneously, full antiseptic precaution was taken. In whatever part of the

body the injection was made, the skin was first thoroughly cleaned; the needle and syringe were always well cleansed with alcohol. The preparation of the ferrous manganese citrate was that made by Merck. The solution prepared, after careful trials, by Mr. Taylor, our apothecary at the Pennsylvania Hospital, was a 20 per cent. solution, and was found to be clear and permanent by Dr. Nicholson, the resident physician, who used it extensively in the wards. The albuminate and peptonate of iron (Merck) made turbid mixtures that did not keep well. Mr. Taylor's directions for preparing the solution are: to powder the crystals in a mortar, and gradually dissolve them in hot distilled water, one grain of the crystals to five minims of water. The usual dose for an adult is fifteen minims, representing three grains of the compound salt.

Having now detailed the use of the form of iron to which I wish here to call attention, I may be permitted to offer some remarks on the hypodermic employment of iron in general. In passing, it may be observed, as was pointed out to me by Dr. Woodbury, that the whole practice of hypodermic medication originated by Alexander Wood making a small injection of chloride-of-iron solution into a nævus, and conceiving the idea that this method might be employed for the introduction of narcotics in neuralgias. But iron administered subcutaneously for its constitutional effects has had so far a brief history.

Among the first published cases in which iron was used hypodermically was, I believe, the one reported from a clinic of mine at the Pennsylvania Hospital in February, 1878;[1] it was that of a young woman, very anæmic, on whom dialyzed iron was employed. For some years previously, in instances not published, I had used both the ammonio-citrate of iron and the potassio-tartrate, and I have recently found that, about the same time, Huguenin[2] had employed the pyrophosphate of iron with citrate of ammonium, a form of iron officinal in the

[1] Philadelphia Medical Times, March 2, 1878, and Medical and Surgical Reporter, March 16, 1878.

[2] Correspondenz-Blatt für Schweizer Aerzte, 1876, vi.

French *Codex* and the German *Pharmacopœia*, and identical with that described in the United States *Pharmacopœia* of 1870 under the title of pyrophosphate of iron. Quincke[1] injected the citrate of iron, the ferrum citricum oxydatum, which, however, he gave up as causing too much pain. The results in my published case mentioned were good, but subsequent observations proved that dialyzed iron was at times irritating, and I abandoned it, and returned to the ammonio-citrate of iron, as in cases of gastric ulcer mentioned in various clinical lectures,[2] at times also employing the pyrophosphate. Following up these observations, Lamadrid[3] reported some successful cases, as did Luton,[4] whereas Kemp[5] noticed abscesses after the use of dialyzed iron. Since then a number of investigators have taken up the subject of subcutaneous injections of iron; especially has it been investigated by the physicians of Continental Europe. Ciamarelli, as quoted in Dujardin-Beaumetz's *Clinical Therapeutics*, also employed the ammonio-citrate, one grain to about fifteen drops of water. Dujardin-Beaumetz[6] himself used the peptonate subcutaneously, which he speaks of as painful, but as not being attended with grave local lesions. Neuss[7] employed the pyrophosphate of iron with citrate of sodium, a form previously recommended by Rosenthal,[8] in six parts of distilled water, and essentially the same as the ferri pyrophosphas solubilis of our *Pharmacopœia* of 1890. Glaevecke[9] does not believe this to possess any advantages over citrate of iron, a preparation which, unlike the ammonio-citrate, Quincke,[10] as already stated, found to occasion pain and to be irritating. Losio[11] details several cases of anæmia cured by hypodermics of various salts of iron, and expresses the belief that iron thus introduced into the system acts more effi-

[1] Deutsches Archiv für klin. Med., 1877, vol. xx.
[2] New York Hospital Gazette, 1879, and College and Clinical Record, September 15, 1883.
[3] New York Medical Record, July 6, 1878.
[4] Le Mouvement Médical, No. 25. Paris, June, 1879.
[5] New York Medical Record, June 15, 1878.
[6] Clinical Therapeutics, 1885.
[7] Zeitschrift für klin. Med., 1881, Bd. iii.
[8] Wiener med. Presse, December, 1878.
[9] Archiv für Exper. Path. und Pharmakol., 1883, Bd. xvii.
[10] Deutsches Archiv für klin. Med., 1877, Bd. xx.
[11] Rivista Clinica di Bologna, 1887, No. 5.

ciently and promptly than when given by way of the digestive organs. A number of other Italian observers, such as Bompiani, Mori, and Magagni,[1] hold similar views. The latter recommends citrate of iron as well as the pyrophosphate citro-ammoniacal, and the pyrophosphate dissolved in distilled boiling water. The solutions ordinarily employed are 10 per cent. solutions. Doenitz,[2] in Tokio, Japan, uses the solution of the sesquichloride of iron in albuminous water, especially in the anæmia of beri-beri. Rummo[3] is partial to the same solution of the iron and ammonium citrate, as is Dori,[4] who uses no more than one grain of this daily. Chicandard[5] employs the ammonio-ferrous sulphate because it is permanent and soluble; and, besides the form of pyrophosphate above mentioned, Rosenthal[6] has experimented with the peptonate and with the oleate of iron. Stockman[7] uses both the peptonate and sodic citrate of iron. The lactate, and the sulphate, dissolved in alcohol, have been also tried.[8] Jaillet[9] employs sublimated perchloride of iron with dry peptone dissolved in pure glycerin and distilled water, while Riva-Rocci,[10] from a recent experience of six years, gives the preference to the ammonio-citrate of iron, now more generally designated as the iron and ammonium citrate, given in doses of 0.05 to 0.30 gramme ($\frac{3}{4}$ grain to $4\frac{1}{2}$ grains). The testimony on the whole is most strongly in favor of this preparation. It is also the salt I prefer, with the single exception of the compound employed in the cases mentioned in this paper, and concerning which it may be a question in how far the manganese aids the iron.

A number of those who have used iron subcutaneously inject it into the back as occasioning less pain; Magagni prefers the nates.

[1] Il Raccoglitore Medico, 1890, No. 18, vol. ix.
[2] Berl. klin. Woch., 1879, No. 36.
[3] Compendio de Terapia Clinica. Naples, 1886.
[4] La Riforma Medica, July 29, 1893.
[5] Lyon Méd., 1887, lvi. 12.
[6] Quoted in Sajous's Annual, 1892, vol. v. A–92.
[7] British Medical Journal, April 29, 1863.
[8] See H. Gillet: Formulaire des Médications Nouvelles, p. 97. Paris, 1896.
[9] Etude Physiologique et Clinique sue la chloro-peptonate de fer; see also Dujardin-Beaumetz: Dictionnaire de Thérapeutique, Supplement, article "Fer," p. 341. Paris, 1895.
[10] Sixth Italian Congress of International Medicine, Rome; Universal Medical Journal, 1895, p. 366.

The dose of iron for hypodermic use should not, to begin with, be more than one-half of what is given by the mouth. It gets rapidly into the circulation. Rosenthal[1] injected 0.04 gramme of the pyrophosphate in solution into his own thigh, and thirty minutes afterward found the iron present in the urine. The effect on the nervous system, of iron used subcutaneously, is described as a sense of strength and excitation—in some cases, where large doses were given, amounting even to delirium; of this I have personally seen no instances, nor have I of the sneezing, the nausea, and vomiting that are said to have occasionally followed its employment. Fever has been stated to sometimes happen; this may be due to general want of care in hypodermic medication; I am, from experience, unacquainted with its occurrence, if we except the doubtful instance in Case I.

Iron ought not to be used in the hypodermic form indiscriminately. It is mostly unnecessary to subject the patient to the annoyance of this form of medication; but where rapid action is needed, as after exhausting hemorrhages, or in anæmic persons with delicate digestion who cannot assimilate iron by the stomach at all, or in gastric ulcer where it is desirable to prescribe iron, or when iron given by the mouth constipates excessively, or when a decided action on the nervous system is required, and one that shall be produced as promptly as possible, I think it is by far the most advantageous way of using it.

It has been claimed for iron thus introduced into the system, for instance by Riva-Rocci,[2] that it remains in the organism as an assimilable substance, producing hyperæmia in various organs and tissues, favoring the absorption of œdema in anæmic patients, the destruction of old red blood-corpuscles and the formation of new hæmatins. If this be true, the effect of hypodermic injections will be much more lasting than that following other forms of administration. Magagni[3] dwells upon the circumstance that when iron is thrown under

[1] Wiener med. Presse, December 1, 1878. [2] Loc. cit. [3] Loc. cit.

the skin it acts directly upon the whole blood-forming apparatus, and not indirectly, as when introduced by the mouth; while Stockman[1] holds that it is stored up in the liver, from which it is slowly excreted into the blood. Be this as it may, it is certain that there is a field for iron employed hypodermically that is not exhausted merely by instances in which it is more advisable, on account of poor digestion, to so give it; but, as with opium and other drugs, we may from hypodermic use get results that are not only more speedy, but sometimes different from those obtained by the ordinary methods of administration.

DISCUSSION.

Dr. F. P. Henry: I was very much interested in the paper as a whole, and especially in the statement that in the first case the swelling of the spleen persisted, notwithstanding the great improvement in the patient's general condition. Tumefaction of the spleen was noticed as one of the results of iron used in this way by Dori, of Pisa, in a paper published in 1893. This observer noticed that in five out of a series of cases, the number of which I do not recall, there was swelling of the spleen which he attributed to stimulus of the hæmatopoietic function of the organ. Dori used three preparations of iron: the ammonio-citrate, pyrophosphate ammonio-citrate, arseniate of the sodio-citrate. He gives the decided preference to the ammonio-citrate in doses of one-half grain hypodermically. In the same year, 1893, Dr. Ralph Stockman, of Edinburgh, wrote an elaborate paper on the treatment of chlorosis, and reported a number of cases in which the hypodermic injections of iron were successful, as in the cases reported to-night. I think that in states of gastric irritation, such as are present in gastric ulcer, the use of iron in this way may be very efficient. My own experience with this method is, however, very limited. I recently ordered a few injections of dialyzed iron for an old woman with pernicious anæmia, and after she had one injection she said that she would rather die than have another, and a few days later her wish was gratified.

Dr. J. M. Da Costa: With reference to the size of the spleen, I would ask Dr. Meigs to speak; I turned the case over to him.

Dr. A. V. Meigs: I am sorry to say when the man came under my charge he was so nearly convalescent that, being pressed with work in the wards, I never made any careful examination of him, and after a short time he was discharged.

[1] Loc. cit.

Dr. Henry: I think that the dialyzed iron, which I used, is not a suitable agent for use by this method. Dr. Da Costa has certainly rendered a great service in making his investigations and in introducing this new preparation to the profession.

Dr. Thomas S. K. Morton: Has the pepto-manganate been used for injection?

Dr. Da Costa: In reply to the question of Dr. Morton, I would say that the peptonates and similar preparations of iron make turbid solutions and do not keep well. We tried several of Merck's preparations, but they did not keep as well as the citrate of iron and manganese, which makes a clear and permanent solution.

A CASE OF TUMOR OF THE CEREBELLUM IN WHICH OPERATION WAS REJECTED.

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[Read May 6, 1896.]

Tumors of the cerebellum, according to the statistics gathered by Mills and Lloyd, Starr, Gowers, and others, are among the most common of intracranial neoplasms. The proportion, in round numbers, appears to be about 25 per cent. They are especially frequent in children and young adults, in whom the prospects for long life should be, as a rule, the best. They are peculiarly disabling, entail extreme suffering, and, unless something can yet be devised for their relief, they are necessarily fatal. The most common varieties are the tubercular and the gliomata and sarcomata, all of which are decidedly unfavorable, because, first, the tubercular form presupposes a constitutional infection; and, second, the gliomata and sarcomata belong to groups of neoplasms the members of which are likely to be recurrent and malignant. The causation of tumors of the cerebellum, just as of all other tumors of the brain, is usually obscure. The tubercular varieties are, of course, the results of systemic infection. The gliomata and sarcomata, however, occasionally appear to be due primarily to trauma. This, to be sure, is usually an obscure question, for the simple reason that injuries to the head, especially blows, are so common that it is often possible to elicit a history of such an injury without at the same time it being possible for the observer to be certain that such an injury in a given case acted as the true exciting

cause. In case, however, such a history can be established, especially if the injury has left a permanent external deformity of the bones of the skull over the region of the cerebellum, the indication and temptation for operation are greatly increased, and the case appeals strongly to the neurologist and surgeon to give the patient any possible chance that may arise from surgical interference.

These considerations arose prominently in the case which I am about to report. The man had received a severe injury to the occipital bone several years before the onset of the symptoms of tumor. This injury had evidently caused a fracture of the external table, at least, and had left a very marked deformity. There was, however, a history of subsequent syphilitic infection. The symptoms pointed to a localization of the tumor at a possibly accessible point, and their onset was so recent at the time the patient first came under observation that it appeared probable that the growth had not made great progress. These facts led to the serious consideration of the advisability of operation; and finally, in consultation with my colleagues, Drs. Mills, Dercum, and Laplace, I had decided to have it done. The date had even been fixed for the operation when circumstances, not directly connected with the case, made it necessary to postpone the day. Before a second date had been fixed the patient's condition changed so much for the worse that, in view of the dangers and uncertainty of all operations beneath the tentorium, the operation was finally abandoned.

The history of the case is as follows:

A. L., aged thirty-eight years, white, male, married, a brass-polisher by trade. His family history was negative. The patient had had syphilis, but denied alcoholic habits. Seven years ago he was struck on the occiput by a fragment of a grindstone which had exploded. The extent of this injury and the duration of his disability from it could not be satisfactorily learned. He stated in general terms that he "soon recovered," but that ever since the accident he had been troubled with violent headaches, which were quite frequent. Five weeks before his admission into the hospital, in February, he began to have violent shooting pain, different from his headaches, but situated, like them, in the occipital region. He noticed then that his vision

was failing. He had also attacks of vertigo, but no vomiting, except once about one week before he came to the hospital.

Upon his admission, in February, 1896, the patient was at once seen to have a characteristic cerebellar gait and attitude. His head and trunk were forced to one side (the right), even when he attempted to sit up in bed. When he

FIG. 1.

Patient with forced attitude from tumor of the cerebellum.

attempted to walk, which he could do only when supported on either side, this forced attitude was still more marked. It seemed as though some power within the patient, not himself, forced his head and trunk to one side. At times, however, this attitude was not so obviously forced, although always to the very end he tended to assume this position when raised in bed.

The patient was almost completely blind, and had dilated pupils. He had a hesitating speech, and the slow cerebration not infrequently seen in cases of tumor of the brain, though rather more marked, in my experience, in cases of tumor of the frontal-lobes than in other regions of the brain. The knee-jerks were exaggerated and a slight ankle-clonus, more marked on the left side, was noted. There was no anæsthesia, nor any paralysis of the arms or legs. When lying down the patient had good control of his legs. The muscles supplied by the fifth, sixth, seventh, ninth, and twelfth nerves were not paralyzed. There was no involvement of the bladder or rectum. The pain was not quite so urgent a symptom as it had been at the commencement. The patient slept and ate well. Vomiting at this time was not marked, There was no history of convulsions. The lungs, heart, and kidneys were normal.

After admission the patient's condition remained comparatively unchanged for some weeks.

The examination of the eyes was made with great care by Dr. Oliver, who reported as follows:

"Ophthalmoscopic examination shows that the pupil of the right eye is five by six millimetres in size, with its long axis at forty-five degrees. The media are clear. There is a marked choked disk, the extreme summit of which is situated down and in and extending forward into the vitreous to six dioptres' height from a two-dioptre fundus. The retina in the vicinity of the disk is swollen. The retinal veins are small and carry dark blood. The retinal arteries are very much reduced in size. The nerve-swelling appears very solid, white, and compact, and stands out in prominent contrast with the swollen retina. Between the macula and the disk and beneath the macula there are a few points of commencing degeneration.

"The pupil of the left eye is the same as that of the fellow-eye, except that its long axis is at one hundred degrees. The media are clear. There is a similar choking of the disk, the summit of the swelling extending seven dioptres into the vitreous from a two-dioptre level of the rest of the fundus. The disk is diffusely swollen, its edges being nowhere visible. The retinal veins are reduced in size except at the summit of the disk, at which place they are engorged with very dark blood. In this position the lower temporal vein curves directly into the substance of the disk and is surrounded by a congeries of fine swollen capillaries and minute capillary hemorrhages, distributed through which there are a number of brilliant crystalline masses. The retinal swelling is more extensive than it is in the other eye and gradually shelves down to the normal retinal plane far out in the periphery of the fundus.

"Vision in the right eye seems to be absolutely lost, while that of the left eye is reduced to the ability to see strong light stimulus in a contracted and flattened field embracing the fixation-point.

"Careful examination of the irides shows that with the exception of a

slight response of the left iris to very strong light stimulus there is no reaction directly or consensually to light, accommodation, and convergence. The eyeballs are freely mobile in all directions, though when fixation is carried outwardly, either to the extreme right or to the extreme left, a series of horizontal oscillatory movements, that continue as long as the effort at fixation is maintained, are constantly induced."

On March 11th, about four weeks after admission, the man began to have incontinence of urine, apparently due largely to defective cerebration. He continued quiet and apathetic, lying on his back with his head somewhat retracted and deviated to the right. There was but little complaint of pain, even when the patient was roused and his attention called to the subject. A few days later he had several attacks of vomiting, but these were not persistent, and such attacks were never a conspicuous feature of the case.

During all the period of his illness in the hospital close observation failed to determine paralysis of the cranial motor nerves from the motor branch of the fifth down. The action of the seventh nerve especially was watched and tested, but at no time was the characteristic peripheral paralysis of this nerve observed. The acoustic nerve of one side (the right) was apparently dulled, but I regret that critical tests with the electric current could not be used for this nerve, because of the patient's mental condition. The muscles of swallowing supplied by the gastro-pharyngeal or ninth nerve and the muscles of the tongue, supplied by the twelfth, were never involved sufficiently to be notable. The patient's mental state rendered fine tests for some of these muscles difficult and unsatisfactory. Still, the ability to swallow and to protrude the tongue remained good until the end. There was never any anæsthesia in the territory of the fifth nerve, nor on the trunk or extremities.

As the case progressed, during March, the patient became more stupid. He had headache, which was not constant. He answered questions, but slowly and vaguely.

The advisability of operation was discussed with Dr. Laplace, surgeon to the hospital, and later with Dr. Mills and Dr. Dercum. The diagnosis of a cerebellar lesion could not be doubtful, and the indications were all in favor of its being a tumor. The localization was approximately indicated by the forced movement; the tumor was near or in one of the middle cerebellar peduncles—but which one was not certainly indicated. The absence of involvement of the seventh and ninth nerves rather pointed to the growth being remote from the under surface of the cerebellum—and, in fact, my fear was that it was within the fourth ventricle, where most of these tumors that have occurred in my experience have been. The exemption of these nerves was one of the chief reasons for this fear. None of these considerations certainly could have led anyone of us to advise operation. But there was one feature of the case that seemed to favor it. This was the injury to the skull. A quite prominent deformity to the right of the middle line was notable on the occipital bone. It seemed almost like an exostosis. It was

this lesion, more, I think, than anything else, that led to the determination of making at least an exploratory incision and removing this portion of bone. As said already, however, this operation was at first necessarily postponed. and finally, and as it would seem fortunately, it was voluntarily abandoned.

The patient failed gradually, without further marked change in his special symptoms, until April 10th, when he passed into a stuporous condition, with labored respiration and œdema of the lungs, and died. He never had a convulsion.

The findings at the autopsy were as follows:

Body. Emaciated, but not to a marked degree.

Lungs. Old adhesions of the pleura. Some anthracosis.

Heart. Some hypertrophy of the left ventricle. Heart nearly completely covered by the lungs anteriorly.

Spleen. Small; capsule thickened.

Liver. Normal.

Kidneys. Slight interstitial nephritis. A few small cysts were found on the surface of the right kidney.

FIG. 2.

Tumor of the cerebellum.

Brain. Calvarium of usual thickness; on the occipital bone to the right of the median line an exostosis was found, it being external, as the inner table is not affected. Membranes of the brain normal. No œdema. From the under surface of the cerebellum there is a neoplasm lying between the pons and medulla on the one hand, and the right lobe of the cerebellum on the other. Across its surface course several nerve-trunks, probably the seventh and eighth, stretched and atrophied, further back probably the fibres of the twelfth.

This tumor is oblong in shape, 5½ cm. in length, and 2½ cm. in breadth at the widest part. The growth[1] springs from the middle cerebellum peduncle. The posterior part of the tumor where it lies between the oblongata and the cerebellum is cystic. The anterior portion where it protrudes freely is solid. The under surface of the right cerebellar hemisphere is excavated, apparently by pressure of the mass, and in the excavation there is a cyst formed by the membranes. Upon opening the fourth ventricle by cutting through the vermis, it is seen that the fourth ventricle is entirely clear, none of the neoplasm entering it. The tumor springs entirely from the under and external surface of the middle cerebellar peduncle. The corpora striata and optic thalami are normal. They are not enlarged, but they have not been opened because the specimen is to be kept for hardening and microscopic examination. The spinal cord shows œdema and degeneration of the lateral columns.

Analysis of Special Symptoms. The high grade of optic neuritis seen in this case corresponds exactly to what is usually seen in all cases of tumor beneath the tentorium. This tumor was not in very close proximity to the anterior quadrigeminal bodies or to the optic tracts, and yet blindness was one of the earliest symptoms. This is probably explained in these cerebellar cases by pressure and obstruction of circulation and of the lymph-channels. It is noteworthy that there was almost complete ophthalmoplegia *interna*, but no ophthalmoplegia *externa*. As the nuclei for the internal muscles of the eye (the iris and ciliary muscles) are known to lie furthest anterior, beneath the Sylvian aqueduct, of all the nuclei for the oculomotor branches, it seems rather odd that they should be more involved than these latter. Of course, this paralysis may have been due to the fact that the optic neuritis impaired the reflex arc.

The proximity of the tumor to all the cranial nerves below the fifth and the exemption during life of all these nerves (except the eighth) is also noteworthy. It cannot be claimed for certain that none of them was involved, because the patient's condition did not admit of as exact tests as could be wished—but the trunks of the sixth and seventh on the right side, the latter of which lay apparently immediately across the

[1] The photograph of the brain in this case was made by Dr. C. Y. White, Resident Physician.

growth, were certainly not paralyzed. The paralysis of the muscles supplied by these nerves is so conspicuous and unmistakable that it does not seem possible that such paralysis could have been overlooked in a patient so faithfully watched as this man was by all the attendants. The inference is that these nerves, while still in the posterior cranial fossa, will endure more pressure and abuse than they will after they leave the fossa. This is probably because pressure does not so readily affect them there.

The absence of any direct connection between the old lesion of the occipital bone and the tumor is also noteworthy. As can be seen from the specimen, the tumor is quite remote from the part of the skull involved. The bone-injury had apparently been confined entirely to the external table; the inner table and the underlying membranes were absolutely normal.

The tumor is evidently a gliosarcoma which has undergone some cystic degeneration. It has no appearance whatever of being a gumma.

Variations in the knee-jerks, as reported in some cases of cerebellar tumor, were not noted in this case. Such variations are probably caused, in cases in which they occur, by variations in pressure.

The forced movement, as seen in this case, while highly characteristic of a tumor near or involving the middle cerebellar peduncle, is of little localizing value for the surgeon. This is for the reason that the tumor may just as readily be on the ventricular aspect of the peduncle or even within one hemisphere of the cerebellum near the peduncle, as on the outside of the cerebellum. It does not seem certain, moreover, as yet from these forced movements which peduncle is involved. In the majority of cases the movement is *away* from the side of the lesion. In my case it was toward this side.

The question of surgical interference in cases of tumor of the cerebellum does not often arise, for the excellent reason that in all these cases such a proceeding must be largely experimental and most hazardous. In the case here reported it seems clear to me, in the light of the autopsy, that the result would

inevitably have been fatal. The difficulty of localization sufficiently exact for surgical purposes must always be very great, and the technical difficulties we may well suppose will baffle the best and most self-possessed surgeon in most of these cases. In a recent case, Gerster,[1] of New York, attempted to remove a cerebellar tumor, which was afterward found post-mortem to be in a position very similar to that of the tumor in my present case, but he was entirely unable even to get near to it. He made his incision through the skull above the attachment of the tentorium, along which runs the lateral sinus, intending to raise the occipital lobe and to reach the cerebellum through an incision in the tentorium, but he was prevented by the great pressure from within the posterior fossa and by an immense cerebral hernia. His patient died in two weeks.

DISCUSSION.

Dr. S. Weir Mitchell: I have seen in the last two years six cases of tumor of the cerebellum, in all of which I have prevented surgical interference. I have seen one case where it was attempted, and rapid death occurred. I have seen two cases within four weeks, and in neither case was there any twist of the head. In all of the cases where I have had post-mortem examinations the twist has been toward the side of the lesion, and not away from it.

I shall refer to only one other point, and that is with regard to the knee-jerk in these cases. In several, and notably in a recent case in a child, the knee-jerk has varied, one day being marked and the next absent. Dr. Dercum in his book speaks of the knee-jerk as always being excessive. Dr. Sachs says there is no knee-jerk in these cases. My own opinion is that this is a variable symptom and may give rise to a great deal of confusion.

Dr W. W. Keen: I have very little to say so far as radical treatment is concerned. There have been very few cases of successful removal of cerebellar tumors. The case referred to by Dr. Lloyd shows the excessive difficulty that may arise. Attempting to reach it through the tentorium, the hernia cerebri was so great that the operation could not be continued. I should discourage attempts at removal except in cases in which the tumor is probably superficial.

[1] American Journal of the Medical Sciences, May, 1896.

As far as palliative treatment is concerned, I think that much may be done especially to relieve headache. A large removal of the occipital bone has been done by Horsley, first on one side, and then, at the request of the patient, on the other side, so that practically the entire bone was removed, with happy results as to headache. Tapping of the ventricles, also, may give relief.

Dr. Charles K. Mills: I saw this patient with Dr. Lloyd, and, chiefly on account of the external appearances, thought it would be well to operate. Tumors of the cerebellum are in a general way easy to diagnosticate, but it is exceedingly difficult to determine their exact position and ramifications. My own experience teaches me that in only one position is it desirable to suggest operation, and that is where one lateral lobe is involved and there is evidence that the tumor has not extended to other parts. The tumors that I have seen have shown a special tendency to invade the peduncles and the pons.

This growth emphasizes a point to which I have previously called attention, viz., that not infrequently a tumor will involve important parts which should give definite symptoms, and yet these symptoms are not present. This is particularly true of tumors in this location.

As to operation, it seems to me that in these cases the trephining should be lower down, and the attempt made to reach the growth below the tentorium rather than through it, unless the symptoms indicate that the tumor proceeds from the tentorium itself.

Dr. Francis X. Dercum: With regard to the knee-jerk, some years ago I wrote a paper on cerebellar tumors, and detailed four or five cases. I pointed out the variable character of the knee-jerk; how at times it would be absent and at other times present and exaggerated.

With regard to the point raised by Dr. Keen, I have seen that illustrated in a case where an error of diagnosis was made. The tumor was regarded as frontal; trephining was done and the headache relieved.

One point in Dr. Lloyd's case is of extreme interest. This patient had a distinct acromegalic appearance; he presented the large nose and chin and the large bones and broad hands seen in that affection. I do not know whether or not the pituitary body was examined.

Dr. Lloyd: I was familiar with the fact that variations in the knee-jerk occur in cerebellar tumors. I watched for them in this case, but did not detect them. These variations may be due to variations in pressure, which are not uncommon in intracranial growths. This would also account for variation in some other symptoms.

A surgical procedure which I think might be of service here, as a preliminary measure, is lumbar puncture. I think that in any future case in which I were tempted to recommend operation, I should suggest such puncture as a preliminary. Of course, if the pressure made by the growth were upon the Sylvian aqueduct the worst symptoms would be caused by the hydrocephalic

condition, dilatation of the lateral ventricles, etc.; and we could hardly suppose that lumbar puncture in the majority of cases would relieve that. The drawing off of the fluid from below might, however, be sufficient to displace the growth in some cases, and thus relieve enough of the pressure upon the Sylvian aqueduct to allow some of the fluid to escape.

I saw no resemblance to acromegaly in this case, as Dr. Dercum has suggested, and at the autopsy I found the pituitary body normal.

Dr. J. Solis-Cohen exhibited a new form of tongue depressor and showed electric light attachment for same.

A CASE OF PERFORATE SEPTUM VENTRICULORUM, WITH REMARKS ON THE DIAGNOSIS.

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[Read May 6, 1896.]

The object of the following observations is not to review the cause, relative frequency, and pathological anatomy of the various congenital cardiac lesions, but merely to consider, cursorily, the diagnosis of some of the forms, as exemplified by the case-history and heart of a child with perforate septum ventriculorum.

The differentiation during life between the various congenital cardiac diseases is well-recognized as peculiarly difficult and usually absolutely impossible. This is due partly to the fact that there has not been sufficient opportunity for extended study, but still more to the fact that the lesions are so often combined ones. For instance, perforate septum ventriculorum is often combined with valvular or other lesions. So, too, atresia or great stenosis of the pulmonary orifice necessitates the existence of some method which allows the blood to pass from the right to the left side of the heart, as through a perforate auricular or ventricular septum, while there must also exist some means of its reaching the lungs, as by a patulous ductus arteriosus. Another source of difficulty in diagnosis is that there are so many congenital defects apart from anomalous openings or diseased valves, whose existence can hardly be predicated, and for which we have no characteristic symptoms. Such, for instance, are anomalous origin of the aorta or pul-

monary artery, the existence of a two-chambered heart, and the like.

As a rule, therefore, owing to these varied complications, it is not possible to make even an approximate diagnosis. Nor can we even reason that because a certain lesion or definite combination of lesions is present we must therefore have definite symptoms and physical signs invariably produced. As we well know, such reasoning is fallacious even as applied to the simpler post-natal cardiac diseases. On the other hand, it seems possible that we may occasionally be able to conclude from certain symptoms and signs that we have to do with a certain lesion; yet always, we must admit, with the feeling that the diagnosis might be modified greatly by a post-mortem examination. In the following case the diagnosis made during life was based upon the sum of the probabilities present, and was upheld by the autopsy:

May H., aged four years, entered the Children's Hospital in this city, on January 8, 1896, suffering from diarrhœa and vomiting. Both mother and father had been subject to rheumatism to some extent. There was no family history of tuberculosis. The child had been nursed at the breast until eleven months old, and since then fed apparently in a proper manner. She had had none of the diseases of childhood. She had always been pale and rather delicate. She had had a slight cough for some time, and the mother had noticed that she had some shortness of breath and forcible cardiac action after coughing. Yet dyspnœa had never been urgent, and there had been no cyanosis or œdema at any time. In fact, the child had been in very fair health, except that she had, even while nursing, a tendency to looseness of the bowels, and that this had persisted ever since.

When admitted to the hospital she was having watery, greenish, offensive stools, containing mucus and some undigested milk, and was vomiting every evening quite a large amount of undigested food. Abstracts taken from the clinical history read as follows:

Examination on admission. The child is fair, pale, and undeveloped. There is no dyspnœa, œdema, cyanosis, or clubbing of the fingers. The examination of the lungs is negative. The cardiac dulness is bounded by the second interspace, the right edge of the sternum, and a line one-half inch to the left of the left nipple-line. The apex-beat is in the fifth and sixth interspaces in the nipple-line, and is forcible. There is a systolic thrill most marked in the second and third interspaces near the sternum. A loud, smooth, systolic murmur is audible at the apex and is transmitted into the

axilla. At the xiphoid cartilage and at the pulmonary cartilage it is louder than at the apex and is very loud also over the mid-sternum. It is probably loudest along the left edge of the sternum, especially in the second interspace. The pulmonary second sound is very greatly accentuated. The aortic second sound is normal, not so loud as the pulmonary. A very faint systolic murmur can be heard at the aortic cartilage. In the fourth interspace just within the nipple there seems to be a faint, low-pitched rumble just before the first sound.

January 11. The temperature has risen and symptoms of pneumonia have appeared, although without definite physical signs. The systolic murmur is audible all over the back.

14*th*. All the symptoms of pneumonia are well marked, the dyspnœa being very decided, but there are no certain physical signs of the disease. The pulmonary second sound is strikingly loud and ringing, and the heart's action very forcible, with a heaving impulse over the præcordium, apex, and epigastrium. The murmur is loudest in the second and third interspaces close to the left sternal margin.

16*th*. Coarse mucous râles can be heard in the upper part of each lung behind, and respiration seems slightly bronchial, with increased vocal resonance, but there is nothing sufficiently positive heard to base a diagnosis upon it. The child is pale and weak, the lips cyanosed, the superficial veins of the thorax and abdomen are somewhat distended, and dyspnœa is present.

17*th*. To-day for the first time positive evidence of consolidation can be made out at the right apex.

25*th*. The general condition is very greatly improved, and the fever has gone.

28*th*. The physical signs of consolidation have largely disappeared.

A few days later it was noticed that the child seemed to be losing strength and weight, and suffered from paroxysms of coughing, accompanied by shortness of breath. The bowels were regular and the digestion apparently good, but there was almost complete anorexia. The cardiac physical signs were unchanged. As time went on the child failed to improve. Her blood-count on February 12th was 3,500,000 red blood-cells and 75 per cent. hæmoglobin. She vomited considerable mucus, especially after coughing. There was no fever of any moment. The slight physical signs of right apical consolidation remained. Then upon February 15th there was a sudden access of fever and a second attack of pneumonia, now involving the whole right upper lobe. Excessive weakness and complete anorexia continued, with vomiting of mucus and food. An effort was made to nourish her by gavage, but without good result, and she died February 21st. During the last week of life no complete examination of the lungs was made, owing to the state of weakness of the child.

The *autopsy* showed a widespread typical broncho-pneumonia of both lungs; but the interest of the case centred in the heart. The notes regard-

ing it read as follows: The heart is increased in size in all dimensions. The right ventricle is much dilated and its walls hypertrophied. The right auricle is dilated and distended with blood. The left auricle is practically normal. The left ventricle exhibits much thickening of its walls. The tricuspid valve is normal and the mitral valve also normal. The pulmonary orifice is dilated, but the valves are larger than normal and apparently entirely competent. The pulmonary artery above the valve is much dilated, and readily admits the first joint of the thumb. The branches of the artery are also unusually large. The aortic orifice is unusually small and the leaflets very small and delicate, yet otherwise normal. The aorta throughout the whole of the arch is unusually small, and will hold easily only a lead-pencil. The branches from the arch are very small. The right subclavian and the right carotid arise directly from the main trunk, there being no innominate. The ductus arteriosus is represented by an impervious fibrous cord. A perforation admitting easily the tip of the little finger is situated in the extreme upper part of the posterior and membranous portions of the ventricular septum. Looked at from the left ventricle it lies immediately below the aortic orifice and just opposite the insertion of the anterior mitral leaflet; so that, if this leaflet were detached from the papillary muscles, it would easily cover loosely the perforation. Seen from the right ventricle, the opening is directly opposite the left leaflet of the tricuspid valve, which can by gentle pushing be made to fill it. It is about one-half inch backward and slightly downward from the pulmonary orifice.

The diagnosis in this case seemed reasonably probable on the following grounds, at least this course of reasoning, although theoretical, seems justifiable: Aortic valvular disease and mitral stenosis did not need to be considered, as there was nothing at all pointing to the existence of either of them. A systolic murmur, heard loud over the apex and transmitted to the left and into the back, suggested, of course, mitral regurgitation. This seemed to be borne out, too, by the enlargement of the heart to the right and the accentuation of the pulmonary second sound. There were, however, decided objections to this view. First, and least important, the history of the case pointed rather to a congenital lesion, and this almost certainly would not have been one of the mitral leaflets. Then, again, such a loud murmur with such decided alteration of the size of the heart would, if due to mitral disease, very probably have been attended by tricuspid dynamic insufficiency and consequent œdema and general venous congestion. To this, of

course, there might easily be exceptions, and the point by itself had but little value. The presence of thrill and of the decided enlargement of the heart in so young a child also pointed to a congenital lesion rather than a post-natal one. Finally, and most important, it was striking that the murmur was louder at the left edge of the sternum and at the xiphoid cartilage than in the mitral area proper. The loudness near the pulmonary cartilage could be disregarded, since a murmur is not infrequently heard very loud here in cases of mitral regurgitation, but the other facts needed further explanation.

The other most probable cardiac lesions were then submitted to an analytical review, comparing the probable physical signs and symptoms of each with those present in this case. Pulmonary stenosis would, it is true, have produced a systolic murmur very loud at the pulmonary cartilage, as in this case. Such a condition, unattended by other lesions, was out of the question. There was not present the cyanosis which so commonly—and, according to Moreton Stillé, constantly—accompanies this lesion, and the murmur in the case reported was heard loud at the xiphoid cartilage as well as at the pulmonary cartilage. But what especially excluded pulmonary stenosis was the very remarkable accentuation of the pulmonary second sound; since in pulmonary stenosis this sound is weak.

Tricuspid insufficiency would have produced a murmur situated over the sternum and at the xiphoid cartilage, as in this case; but the murmur would not have been so loud in the pulmonary area, and there would certainly have been the symptoms of passive congestion of the general circulation. A patulous foramen ovale, or any opening in the auricular septum, occurring alone, may present no symptoms at all or may be the cause of intense cyanosis, but is not apt to produce a murmur, and certainly not one heard so loud at the xiphoid cartilage.

A very common combination of lesions which must be considered in this connection is defect in the auricular septum with atresia or great stenosis of the pulmonary valve and patulous ductus arteriosus. It was difficult to exclude this condition in

the case under consideration. Such cases are apt to cause a loud systolic murmur in the neighborhood of the pulmonary cartilage, and might readily be able to produce an accentuated pulmonary second sound, due to the bringing of the aortic pressure to bear upon the pulmonary circulation. But such a condition is almost always accompanied by cyanosis, and is most apt to be confounded with a simple stenosis of the pulmonary artery. Supposing the existence of this combination in the present case, there was no way of explaining the loud murmur heard at the xiphoid cartilage. Yet the situation of the murmur alone is not a positive proof, for we cannot account for this in many cases of congenital heart disease. Thus, in a case of patulous foramen ovale and pulmonary stenosis reported by Peacock, a loud murmur could be heard over the whole enlarged præcordium, and loudest below. Nevertheless, in the case now reported, the absence of all cyanosis was a very important symptom, and spoke strongly against the existence of a combination of lesions which included pulmonary stenosis. The same criticism applies to the supposition of a stenosis of the pulmonary valve with patency of the ductus arteriosus and a perforate septum ventriculorum. Although the murmur in this event might be identical with that in the case reported, cyanosis would with great probability have been present. Patency of the ductus arteriosus occurring alone would not account for the position of the murmur at the xiphoid cartilage.

Leaving out of account anomalous origin of the large vessels, and the like, which could hardly be recognized during life, we are brought by exclusion to the probable diagnosis of perforate septum ventriculorum. There were, in fact, a number of symptoms present which made the diagnosis justifiable. With a perforate septum without other defect, it was probable that the blood would pass during the systole from the left ventricle, the stronger, into the right rather than the reverse; and, looking at the small size of the aorta and the large size of the pulmonary artery which the specimen presents, it is evident that this occurred. Such a passage, situated as it is so high in the septum, would account for the murmur both at the pulmonary cartilage and over the sternum and præcordium. A rush of

blood under this high pressure into the right ventricle would account for the hypertrophy which percussion showed, and would explain, too, the great accentuation of the pulmonary second sound. The left ventricle would naturally show hypertrophy also, since, just as in mitral regurgitation, it was compelled to pump blood in two directions. It may be mentioned, too, that, according to Roger and Sansom, the murmur of perforate septum is also heard in the back, as it was in this case.

There was no reason why the child should have cyanosis, whichever theory of the causation of the symptom we adopt. Certainly, if admixture of venous and arterial blood is the cause, the patient would have no cyanosis, for the blood was being aërated twice instead of once, and none of the mixed blood was passing into the general circulation. On the more commonly accepted theory, that cyanosis is due to some obstruction to the passage of blood to the lungs, there was equally no reason for cyanosis, since obstruction did not exist, but, as the autopsy showed, the right ventricle was strong and the pulmonary artery unusually large.

A further point brought out by the post-mortem examination was the condition of hyperplasia of the aorta. This reminds us of the statement of Virchow, that such a condition, with smallness of the heart, is the cause of chlorosis. It is readily possible that the anæmia and undeveloped condition of the patient were the result of a constant deficiency in the supply of blood in the general circulation.

I would, in closing, insist once more on the statement that, although this case showed that a diagnosis is sometimes possible, it can never in the present state of our knowledge be more than conjectural. Anyone reading the treatise of Peacock, or the cases reported from time to time in medical journals, cannot fail to be impressed by the lack of correspondence between the lesions and the evidences of the disease during life. But this applies, although in a less degree, to post-natal heart-lesions, and still we analyze our cases of this nature in the effort to understand them. There seems, then, every reason why we should attempt to study congenital heart disease in the same way, and at least endeavor to make a diagnosis.

REPORT OF A CASE OF IMPERFECT CLOSURE OF THE AURICULAR AND VENTRICULAR SEPTA, IN A MAN DEAD AT THE AGE OF FIFTY YEARS FROM ABSCESS OF THE BRAIN.

By FREDERICK A. PACKARD, M.D.

[Read May 6, 1896.]

The patient from whom this specimen was removed was admitted to the Episcopal Hospital on July 6, 1893. He was an American, a sailor by occupation, and was engaged in his ordinary work at the onset of his last illness. His family history contains nothing of interest. He was always healthy, his only illness having been an attack of measles. He denied syphilitic infection, but has had gonorrhœa. He remembers no injury to his head.

His last illness began suddenly, ten days before his admission to the hospital. He suddenly partially lost consciousness, and remained in a semiconscious condition for about ten minutes. His friends told him later that while in this condition he had localized convulsion, involving the muscles of the right eye, the right side of the face, right side of neck, back, and chest, the right arm, and to a less extent of the right leg. He said that after regaining consciousness he had a numb feeling in the whole right side of the body. He was, however, able to walk, to raise the right arm, and to talk without difficulty. Four days later he had another attack of the same character, in which he was totally unconscious. After this attack the right side felt very weak, though he thinks sensation was perfectly preserved. The arm and leg continued useful.

His condition on admission may be summarized as follows: He was a powerfully built, well-nourished man. Face bronzed, but more dusky than would be the case from exposure to the sun alone. Gums darker than normal. Lips very dark and apparently congested. Pupils equal and normal; no ptosis or other sign of interference with muscles of eye or lids. Face symmetrical. Tongue coated, but protruded in median line. Right arm and leg can be moved, but are distinctly feeble. Can talk and swallow perfectly. No lesion of ears. Examination of the heart showed slight enlargement

(direction of enlargement not stated in the copy of the notes in my possession) and a blowing systolic murmur, most plainly heard at the apex, but also present distinctly over the body of the heart. The lungs were negative, save for the presence of a few subcrepitant râles, on both sides posteriorly. Examination of the abdomen was negative. All of the tendon-reflexes were found to be normal, save for slight increase of the knee-jerk and the presence of ankle-clonus on the right side. The temperature was normal; the pulse 80; respiration 24. Urine normal. The late Dr. Heyl, at that time ophthalmologist to the hospital, kindly examined the eyes for me and reported: O. D., inner margin of disk obscured; tortuosity of retinal vessels; O. S., vessels tortuous; disk normal. There was no glandular enlargement, the teeth were normal, and there were no skin lesions, save for a few blotchy areas on the upper third of the legs.

He was put to bed, an ice-cap was put to the head, and he was given a five-grain dose of calomel, which was to be followed by the iodide of potash, in doses of ten grains, three times daily.

Nothing new developed until the night of July 8th. He then had a slight local convulsion, but the note of the next day says that "It did not bother him sufficiently to call the attention of the nurse to it." On the next day the patient seemed no worse.

At 6.15 A.M. on July 10th the patient commenced to be convulsed again. The right arm and leg began to jerk violently and rhythmically at intervals of two or three seconds. The alternate contraction and relaxation of the muscles closely resembled the effect produced by the slowly interrupted faradic current. The whole right side of the face and body was concerned in the convulsion, the muscles most involved being those of the right upper eyelid, the right side of the face, right side of neck, chest, and back, and the right arm. The right leg only occasionally contracted spasmodically. The note is not very clear as to the mental condition during the attack, but states that "there was no pain whatever," seeming, therefore, to corroborate my memory in regard to the more or less perfect retention of consciousness during the seizure. The attack lasted three-quarters of an hour. After the attack was past he complained of feeling tired, and it was noted that the right arm and leg were distinctly weaker. Careful examination showed no change in sensation.

On the next day (July 11th) he had no attack, but complained of a vague sensation in the left side of the head that made him apprehensive of a seizure. This sensation was lessened by the application of an ice-bag.

On July 12th the patient was more stuporous, and was unable to raise the right arm, to articulate distinctly, or to put out his tongue. His temperature, which for the two preceding days ranged from 98.2° to 99.4°, rose, by 2 P.M., to 100°. A small quantity of urine was obtained by catheter, and found to be highly albuminous. He was put on the protiodide of mercury on this day.

On the morning of July 13th the temperature was 99.4°; pulse 84; respirations 20. He was unable to move the right arm and could not talk. Swallowing was quite a difficult act. Careful examination showed no other change in his condition. In the afternoon the temperature rose to 102.4°, and his respirations became more labored.

On July 14th the morning temperature was 99°; pulse 90; respiration 22. He had a large number of involuntary stools since the day before. He was unable to take nourishment by the mouth, and was given nutrient enemata. Mercurial inunctions were instituted and the nape was well cupped. During the day Cheyne-Stokes breathing developed In the evening the temperature rose to 102.6°; pulse 104; respiration 26.

During the night and the next day the patient remained unconscious, but no convulsions were present (nor had he had any since July 10th). Death occurred at 5 P.M.

The diagnosis made before death was tumor of the brain of latent course, with sudden accession of symptoms due to hemorrhage within its substance. The location of the tumor was supposed to be in the subcortical region on the left side of the brain, the destruction of brain-tissue being probably greatest near the origin of the internal capsule, but it was supposed that the hemorrhage was at first most marked near the cortical side of the tumor, producing irritation of the cortex and convulsive seizures. How erroneous the diagnosis was can be seen by the report of the necropsy. While the possibility of cerebral abscess was, of course, considered, the absence of middle-ear disease, of trauma, of primary focus of pus, caused that, the easiest explanation of the symptoms and course of his illness, to be rejected.

Post-mortem examination was made on the day after death, and the following notes were dictated: Well-nourished body; skin dark. There is some dense œdema of the legs, and on the shins a copper-colored, diffuse eruption, with small superficial scars.

Scalp and calvarium are normal; also bone, dura, and sinuses at base of skull. Dura mater is somewhat adherent to convexity of cerebral hemispheres. Beneath the pia arachnoid covering the lower surface of the cerebellum there is a diffuse movable collection of about a drachm of greenish-yellow pus. Arachnoid in that situation is opaque, thickened, and wrinkled. Base of brain is normal, except for some overfulness of the vessels. Island of Reil is normal on both sides. Vessels of pia arachnoid over convexity generally are filled with dark blood. Over parietal lobe of left side, pia arachnoid is adherent to brain substance. On handling the brain a rupture took place just behind the supramarginal gyrus, and about an ounce of fetid, greenish, thick pus escaped. The left lateral ventricle filled with greenish pus, and the ependyma is thickened, granular, dark, and almost gangrenous in appearance. The surface of the basal nuclei was softened. On the right side the lateral ventricle and its nuclei were normal. In the third ventricle there was some greenish pus similar to that in the left lateral ventricle, but

the ependyma looked quite normal. The iter contained a little pus, as did also the fourth ventricle. The wall of the latter was granular and softened. On section of the hemisphere it was found that beneath the supramarginal gyrus of the left side there was a walnut-sized cavity, with black, gangrenous walls, just beneath the cortex and extending inward and downward to open into the lateral ventricle, and also extending forward and downward into the basal nuclei. On section of the basal nuclei of the left side, it was found that the abscess cavity had encroached upon the lenticular nucleus, the whole lower two-thirds of which were gangrenous. All of the basal nuclei on the left side were distinctly softened. Organs of abdomen are in normal position. Pleural cavities are normal and free from fluid and adhesions. Pericardium is normal.

Primary section of the heart shows that all chambers are filled with clots. In all chambers there is much chicken-fat and currant-jelly clot, but there is also a small quantity of adherent *ante-mortem* clot. Heart is globular in shape. Apex is made up of right ventricle. Large proportion of the total bulk of heart is composed of the right auricle. Coronary arteries are very prominent. Weight of heart, when freed from clots, is fifteen ounces. Muscle-substance of all chambers is of a deep brown. Right auricle is tremendously dilated. Appendix of auricle is also much enlarged. Thickness of wall of right auricle at thickest part is about 2 mm. Endocardium of auricle is smooth. Foramen ovale patulous, admitting the end of a lead-pencil. Immediately below the foramen ovale there is a deficiency in the interauricular septum, leaving an arched entrance from the right to the left auricle, that permits of the insertion of the index-, middle-, and ring-fingers. The arch is evidently composed of muscle-fibre; its edge is smooth and rounded, and the surrounding endocardium is thin, clear, and otherwise normal in appearance. The orifice in the septum is bounded below by the lines of attachment of the anterior mitral and posterior tricuspid leaflets. On looking into the right auricle from above, one sees the auricular surfaces of the mitral and tricuspid valve leaflets, and also through the deficiency the posterior wall of the left auricle. The left auricle is very much smaller than the right, being even somewhat smaller than normal. On looking into it from above, one sees the patulous foramen ovale; below this the arching border of the interauricular opening and the interior of both right and left ventricles are plainly to be seen. The auricular appendage communicates with the cavity of the auricle by an orifice that just engages the tip of the middle finger. The right ventricle is much dilated and its wall hypertrophied. The muscle-substance is somewhat darker than normal, but is otherwise of normal appearance. The thickness of the wall is 13 mm. Columnæ carneæ are very thick and firm. Two large papillary muscles spring from the septum, and a diminutive one arises from the anterior wall. The tricuspid orifice readily admits four fingers. Valve leaflets of tricuspid normal, except for their extraordinary largeness. The chordæ tendineæ of the tricuspid valves

are remarkably numerous and very thick. The undefended space is closed merely by the posterior tricuspid and anterior mitral leaflets. The finger readily passes from the channel of the tricuspid into that formed by the mitral leaflets, and the finger so passed through the interventricular deficiency is plainly seen on looking down into the auricles. The pulmonary artery cusps are very large, but are otherwise normal in appearance. The pulmonary orifice measures 10 cm. 1 mm. in circumference. The aortic orifice measures 7 cm. 6 mm. in circumference. The cavity of the left ventricle is relatively small—about two-thirds that of the right ventricle; its wall measures 7 mm. in thickness. Endocardium appears to be normal. There is but little development of the columnæ carneæ. There is only one well-formed papillary muscle, which springs from the posterior wall, is short and very thick. This sends three short, thick chordæ tendineæ to the posterior half of the anterior mitral leaflet and two to the posterior leaflet. The other chordæ to the latter spring from two rudimentary papillary muscles that arise from the posterior wall. The anterior portion of the anterior mitral leaflet stretches across from the chordæ already mentioned as arising from the papillary muscle, and is pushed through the deficiency in the septum in such a way that, upon looking at the edge of the deficiency from the right ventricle, there are seen several short chordæ tendineæ rising from the right side and edge of the septal border and running through the orifice to join the anterior portion of the anterior mitral leaflet. Both of the mitral leaflets are somewhat opaque. The aortic orifice is guarded by three cusps, all of which are freely perforated near their free borders. The cusps otherwise show nothing out of the way. The coronary arteries spring from the root of the aorta in the normal position, the orifices being very large. At the root of the aorta there are a few scattered patches of yellowish-white thickening. The importance of a thorough examination of the arch of the aorta and its branches and of the pulmonary artery was not realized until after the heart had been taken away for more careful study, when it was too late to make a further examination.

Sections of the vermiform appendix show a marked amount of submucous round-celled infiltration generally, while in one area the centre is necrotic, and evidently has proceeded to abscess-formation. The kidneys show diffused round-celled infiltration of the interstitial tissue.

To first dispose of the cerebral abscess, it is possible that it may have been due to embolism from the vermiform process, although it seems an unlikely situation for a solitary embolic manifestation from disease of that portion of the intestinal tract. There was no other possible source of origin for the pus. From the character of the collection in the brain, it was thought to be probably due to disease of the middle ear, but

careful examination of the base, and especially of the petrous bone, showed no evidence of disease. It is possibly only a coincidence, but is at least a remarkable fact, that at the meeting of the American Pædiatric Society held in 1895, three cases of abscess of the brain occurring in the subjects of congenital heart disease were mentioned. One case was reported by Acker, of Washington, and one by Jacobi, of New York, while the subject of the present article was referred to by the writer in the discussion upon these two cases.

The lesion of the heart in this case resembles, in most respects, the not extremely unusual one of patulous foramen ovale, deficiency of the auricular septum, and deficiency of the ventricular septum at the undefended space. The most remarkable features are the large size of the pulmonary artery as compared with the aorta, and the peculiar arrangement of the anterior mitral leaflet, whereby it receives most of its chordæ tendineæ from the right edge of the border of the septal orifice.

While the dissection of the distal portions of the great vessels was not carried out, it would seem that the specimen represents a failure of development—an agenesis—pure and simple, rather than a permanent defect produced by inflammatory lesion preventing the normal separation of the cavities. It is impossible to see why such extensive failure of achievement of this separation should occur where a much smaller amount of communication between the cavities has been ordinarily produced by even extreme stenosis of one of the arterial orifices of the heart. It seems that the deformities present in this case can be readily explained by a failure of the commissural band to form by fusion of the median parts of the auriculoventricular lips of Lindes, with simultaneous failure in development of the primitive interauricular septum and of the median portion of the interventricular septum. The ventricular septum is completed toward the end of the eighth week; the auricular septum forms only after the completion of the separation of the ventricles and that of the arterial bulb. The formation of the commissural band also occurs after the completion of the

latter. It can, therefore, be seen that the time at which this anomaly was produced was just prior to the completion of the interventricular septum, and at a time when the primitive auricular septum was simply represented by a ridge coursing over the ceiling of the common auricle.

The failure of development of the commissural band would account for the peculiar complete absence of separation between the anterior mitral and posterior tricuspid leaflets. Rokitansky[1] has likened the auricular canal after the formation of the auriculo-ventricular lips to a figure shaped thus: |——}, the long horizontal arm of which represents the space between the surfaces of the auriculo-ventricular lips, the shorter perpendicular arms representing the future auriculo-ventricular orifices.

According to Moussous,[2] the relations of the auriculo-ventricular valve leaflets in cases of failure of development of the interauricular septum may fall into one of three categories: (1) The auriculo-ventricular valves remain in relation with the inferior border of the incomplete interauricular septum; (2) they may be inserted upon the superior border of an incomplete interventricular septum; or (3) they are only attached to the commissural band, which has maintained its independence. In the present case the anterior mitral leaflet is divided into two portions—an anterior, springing from the common auriculo-ventricular border and with chordæ tendineæ, which arise from the right side of the interventricular septum and pass through the deficiency therein, and a posterior portion, which arises from the auriculo-ventricular border and has chordæ tendineæ springing from the poorly differentiated posterior papillary muscle. Between these two portions there is a cleft corresponding to the plane of the incomplete septa and, therefore, to the position that should be occupied by the commissural band. The small size of the left ventricle in the present case is very striking, the septum protruding into its cavity, *i. e.*, the septal surface, viewed from the left ventricle,

[1] Die Defecte der Scheidewände des Herzens, p. 68.
[2] Maladies Congénitales du Cœur.

is convex. Upon the left ventricular surface of the septum there is a thickened layer of muscle-fibre, looking not unlike a flattened and poorly developed papillary muscle. Taking into account the position of the septum, toward the left side of the heart, this flattened, aborted papillary muscle on its surface, and the origin of the anterior portion of the cleft anterior mitral leaflet from its upper and uncompleted portion, it seems not unreasonable to attribute this malposition of the leaflet and the small size of the aorta (as compared with the pulmonary artery), with the lessened capacity of the left ventricle to the origin of the ventricular septum from a point too far toward the left, rather than to consider the small size of the left ventricle as dependent upon the small dimension of its arterial trunk. In view of the absence of a careful study of the subsequent character and the main divisions of the aorta and pulmonary artery, it is impossible to deny a transposition of the divisions of the arterial bulbs as the causal factor in the case, but the latter explanation seems to the writer to be less satisfactory than does the former.

In regard to the duration of life in lesions of this character, but little need be said, inasmuch as the principal defect (deficiency in the formation of the auricular septum) is the congenital lesion that is least incompatible with life, save simple failure in the complete development of the interventricular septum at the undefended space. That auricular defect can exist for many years is seen by the following brief summary of facts:

Peacock[1] says: "Where there is only some slight irregularity in the development of the heart, so that small openings exist in the septa of the auricles or ventricles, the defect is of very little importance; indeed, it is by no means uncommon for such openings to be found in the hearts of persons who have died at advanced periods of life, and have never presented any signs of cardiac disease. On the other hand, where the arrest in the development of the heart is more extensive, and

[1] On Malformations, etc., of the Heart, p. 129.

is combined with some form of obstruction, it becomes a source of serious suffering, and the duration of life is limited to a comparatively short period." He gives no definite data as to the length of life of cases with marked septal deficiency, and it would seem that in the above sentence he refers rather to the cases of slight communication between the cavities, as in the case of unclosed undefended space or patulous foramen ovale, than to such marked deficiency of separation as was present in the specimen from my case.

Moussous[1] groups all cases from a prognostic point of view into eleven classes, of which but one—composed of malformations of the interauricular septum—in any way corresponds to this specimen. In this group he collects 19 cases, of which 5 died between the ages of thirteen and twenty years; 6 between twenty and twenty-five years; 5 between twenty-five and forty years; and 3 between forty and fifty years. In this table no statement is made as to the size of the orifice between the auricles, a factor that cannot fail to have much bearing upon longevity. In a heart wherein the primary auricular septum was completely developed, with simply a cribriform arrangement of this, due to failure of development of the secondary interauricular septum, there might be but little commingling of the blood-stream or alteration in the dynamics of the heart.

Rokitansky[2] relates details of twenty cases of defect of the interauricular septum of greater or less degree. Of these twenty cases, two newborn and eighteen adults were subjects of the anomaly. The ages of the adults varied from nineteen to sixty years. As many of these present marked points of similarity to the present case, a brief account of some of them may be not without interest. In Case I., a man dying at the age of fifty-five years with a variety of lesions, including tuberculosis of the lungs, an apparent internal pachymeningitis, and a variety of other lesions unconnected with the cardiac anomaly, there was an interauricular communication, having a diameter of 28 mm., and due to defect in the primary septum. Case II.

[1] Loc. cit., p. 226.

[2] Loc. cit., pp. 34–53.

was an adult (age not stated), whose heart presented a rudimentary interauricular septum, a closed foramen ovale, and a split aortic leaflet of the mitral (as in my case). The interauricular orifice measured 30 mm. in diameter. The man had in addition pericarditis, purulent exudate in the right pleural cavity, ascites, and anasarca. A drawing of the auricular defect in this case[1] fairly represents the appearaace in my own case, save for the closure of the foramen ovale. Case III. died of typhus at the age of twenty-three years, the heart showing an orifice between the auricles that measured 18 by 28 mm., and a split anterior mitral leaflet. Case VI. concerned a sixty-year-old man, whose body showed, in addition to the cardiac anomaly, the remains of an encephalitis. The interauricular communication measured 9 mm. by 5 mm. The case is mentioned here because of the apparent similarity between this and the writer's specimen in regard to the peculiar connections of the aortic leaflet of the mitral valve with the defective septum ventriculorum. Case VIII. died at the age of fifty years, and autopsy revealed, in addition to many small hemorrhagic cerebral lesions and pulmonary artery thrombosis, an interauricular defect measuring 57 mm. in diameter. Case X. died at the age of forty-two years, and possessed an interauricular defect that measured 40 mm. in diameter. The case died with universal œdema, but from the data given it is impossible to determine the influence of the cardiac defect upon the length of life. The other cases either died at a much earlier age or had but little in common with my case from an anatomical point of view.

The facts in my case may be summarized as follows: Clinically, the case is of interest from the fact that the patient apparently suffered so little from a marked cardiac defect that he was able to perform the arduous duties of a sailor until the the onset of a presumably independent cerebral lesion, eighteen days before his death; from the occurrence of a cerebral abscess, the only discoverable source of origin for which was

[1] Loc. cit., p. 37.

the inflamed vermiform appendix. Pathologically, the interest in the case lies in the great lack of development of the septum atriorum, the smallness of the left and large development of the right side of the heart, and the peculiar arrangement of the anterior mitral leaflet and of the chordæ tendineæ of the anterior portion thereof.

DISCUSSION.

Dr. Arthur V. Meigs: These cases are certainly of great rarity. It is wonderful that there should be such an opening between the ventricles as in Dr. Packard's case, and the man live for forty-five years, enjoying life and finally dying of abscess of the brain. From a practical standpoint, it is impossible to make a diagnosis in cases of this sort, and although Dr. Griffith did succeed in estimating that there was an opening in the ventricular septum, yet it would seldom happen that such a result could be obtained.

The theory which Dr. Griffith has given for the murmur seems to me to be true, but it is going rather far to assume that there is greater pressure in one ventricle than the other, and that the blood went from the left to the right ventricle. It is impossible to be sure what was the cause of the murmur.

Dr. J. P. Crozer Griffith: Dr. Packard's case is particularly interesting to me in that it is further proof, if any were needed, that it is not the admixture of venous and arterial blood that produces cyanosis, but that something more than this is required. Stillé's studies years ago supported this view, and it is now very commonly, although not universally, accepted.

In regard to Dr. Meigs's remarks on my own case, I would only say that the same dynamic influences are at work in producing cyanosis in congenital heart disease as obtain in cases developing later in life. I can see no reason why if we attempt, as we do, to make a diagnosis in the latter we should not in the former cases also. It is true that in post-natal heart affections the diagnosis is more often made correctly, partly because we have uncomplicated conditions, but more because we have had a wider experience. Yet even in these conditions we must always stand ready to have our diagnosis altered by the post-mortem examination. In my own case the diagnosis was made by exclusion.

CASE OF CARCINOMA OF DESCENDING COLON; EXCISION AND ANASTOMOSIS; RECOVERY.

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PROFESSOR OF SURGERY IN THE PHILADELPHIA POLYCLINIC.

[Read May 6, 1896.]

J. H. M., aged fifty-two years, a grain-broker, native and resident of Western Pennsylvania, a patient of Dr. William L. Lowrie, of Tyrone, Pa., was seen in consultation by Dr. Musser in August, 1895, at his home.

His father died of apoplexy when fifty-seven years of age; mother is living, aged seventy-nine years. Two brothers are living and well. A sister died of hip-disease in her thirtieth year. He has five healthy children, and lost one, aged ten years, of epilepsy.

He had had no previous illness of note, excepting attacks of rheumatism in 1885 and 1889, and for twenty years has been subject to frequent attacks of "nervousness." These seizures were marked by curious feelings in the splenic region and back, and accompanied by vertigo and coldness of the extremities. They have gradually grown more marked. During the latter half of this long period he has much of the time observed a condition of "uneasiness" in the region indicated; also for several years has felt something like a hitch or slight obstruction to action of the bowel referred to that point. A "knotting" of flatus in that region has also been vaguely felt for a long time. Twenty years ago he had a severe attack of pain in the same portion of the abdomen. He was then freely blistered just below the ribs. This pain was dull and aching in character, and has recurred more or less severely at irregular intervals ever since. During the past two years it has been more severe and frequent. For nearly fifteen years the bowel movements have always been of small diameter, and for eight months never larger in diameter than one-third to one-half inch. For a year he had a constant feeling of obstruction upon the left side, accompanied with a sense

of fulness upon the right. Five years since he first noted blood in the movements. It continued to be present with each stool in small amount for three weeks. Again, eight months before coming under observation, he began passing clotted blood in considerable quantities. It had appeared, especially after the bowels had been inactive, but disappeared when free catharsis was induced. He has always required medicine to produce a satisfactory movement. Twenty pounds of weight have been lost in the preceding eight months. Appetite has been constantly good. Great loss of strength, palpitation, breathlessness upon exertion, and other symptoms of anæmia have been present for some months. Vomiting frequently accompanies an evacuation of the bowels. Defecation has latterly been preceded by much pain and colic in the left hypochondrium. Mucus and foul odor have appeared with the stool within a few weeks.

The striking objective signs at the time of the consultation were pallor, undoubted anæmia, emaciation, and loss of strength, and a curious appearance of premature old age. The physical examination of the heart, lungs, and urine was negative. The abdomen was moderately distended; tympanitic except in the course of the colon, By ordinary methods of examination nothing unusual was found. The rectum contained some feces. The fecal matter discharged in the morning was small in amount, made up of many small pieces, some tinged with blood and mucus, and free mucus and blood followed the fecal evacuation. The colon appeared to contain feces, and hence high enemata were given till the bowel was empty, and nothing but water returned. After emptying the colon of a large accumulation of feces, the patient was turned on the left side. In this position about the seat of pain, and in the course of the descending colon, an obscure induration was detected. The mass seemed to be half the size of the fist. It seemed to recede on deep palpation. After the high enemata were administered, the auscultatory phenomena seemed to indicate that the fluid was passing through a constricted orifice into the dilated colon above. There was more marked tympany in the course of the colon, replacing the dulness above noted. The stomach was evacuated of its contents, and its size determined by the usual methods of physical examination. It was decided to be free from disease.

There were frequent movements of the bowels, the discharges being small in amount and containing some blood Pain was the chief subjective symptom. This was situated in the left hypochondria, extending toward the sigmoid flexure. It was increased by pressure, and apparently aggravated by movement and position, a peculiar position having to be assumed with sitting up in order to relieve the affected side.

Diagnosis of cancer of the descending portion of the colon was made. This diagnosis was based upon the age of the patient; the exclusion of organic disease in all the other organs and structures of the body; the occurrence of emaciation and anæmia, the cause of which could not otherwise be explained; the subjective symptoms; the occurrence of blood in the

stools; the character of the stools otherwise; and the physical signs of an obscure tumor in the region above indicated.

The patient was advised to come to Philadelphia for surgical advice and treatment. He accordingly came to the city on August 21st, and was placed in charge of Dr. Morton, who, having confirmed the diagnosis, urged abdominal section, and, if possible, excision of the growth.

On August 22d, under ether narcosis, an incision three inches in length was made through the left linea semilunaris. Through this opening a mass could be felt intimately connected with the colon, beneath the ribs, and affecting that portion of the gut immediately below the splenic flexure. The incision was then enlarged one inch upward, and the whole mass easily delivered outside the wound. It proved to be a neoplasm involving the entire circumference of the colon just below the splenic flexure and about the size of an orange. No adhesions were present and but a single mesenteric gland was enlarged. The latter was located close to the tumor. The wound and abdominal cavity were then effectually walled off by gauze pads, isolating the mesentery, bowel, and tumor. The colon was clamped in two places above and two places below the growth, but very wide of all infiltration, after feculent material had been well milked from those portions of gut between each pair of clamps. While a stream of salt solution was permitted to flow over the parts, the bowel was divided above and below between the clamps. Then the mesentery was divided cautiously from above downward, and each vessel taken up with a hæmostatic forceps either before it was cut or immediately after. The tumor, with one and a half inches of uninvolved gut above and below it, was thus removed without especial difficulty. The mesenteric vessels in the grasp of the hæmostats were next ligated individually and the previously noted mesenteric gland dissected out. All the parts having been again thoroughly washed with salt solution, one-half of an inch-and-a-quarter Murphy button was slipped into each end of the open bowel. The lower bowel-end gave no trouble in adjusting the button and drawing over the intestinal walls by means of the purse-string, but the upper end was found thin and much dilated or "ballooned," and quite attenuated. With a little manœuvring, however, this difficulty was overcome and the purse-string suture drawn tight about the shank of the half-button, which was then pushed together. The considerable amount of tissue upon the upper portion of the button interfered with firm and secure closure unless considerable force was employed. Hence thick pads of gauze were placed between the fingers and bowel holding the button before the halves were squeezed together—thus so distributing the force as to spare great pressure upon any particular portions of the included bowel. It was considered best to run a continuous silk stitch about the anastomosis, bringing together serous surfaces over the junction line of the button. After another wash, the anastomosed bowel was permitted to drop back into the abdomen. The omentum was drawn down about most of the involved region, and, be-

J. H. M., nine months after operation.

cause of the great attenuation of the upper portion of the divided bowel, a small wick of acetanilid gauze was carried through the wound and its end left in contact with the gut just above the anastomosis. This was done to facilitate drainage if the thin bowel-wall should ulcerate or become gangrenous. The parietal wound was closed with silkworm-gut sutures, leaving a small space in the centre for exit of the gauze-wicking.

The patient bore the operation well, and exceedingly little blood was lost. He progressed well until the second day, when a rise of temperature to 101° F. demanded inspection of the wound. A little serum was found to be escaping along the drain. It was removed and about a drachm of turbid fluid escaped. A small amount of foul serum continued to escape for two days, and was then followed by occasional bubbles of flatus and a little feculent material. Temperature fluctuated from 100° to 101° F. for two or three days, and, coincident with diminution of fecal discharge from the wound, then fell to normal. Very little pain was complained of at any time. Several movements of fluid feces—evidently having passed through the button opening—occurred during the first four days. Liquid food was freely taken after the first twenty-four hours. Gas constantly escaped from the anus after the first day. On the tenth day the patient complained of a full feeling in the rectum, and, upon inserting a finger, the button was discovered and withdrawn. Its opening was partially occluded by a putty-like mass of fecal material. The small fistula leading out of the abdominal wound now rapidly closed and gave no further trouble. It had evidently been caused by a small perforation of the thinned intestine above the button. The passage of the button was soon followed by a very large formed bowel movement, which was repeated, by the aid of enemata, every day. In ten days he was placed upon full diet, and afterward progressed in strength and increase of weight in a most gratifying manner. In three weeks from the time of operation the bowels were moving naturally and the calibre of the stools was at least an inch and a quarter.

Five weeks after operation he was able to take a long railway journey to his home. Since then he has, from time to time, written most enthusiastic letters, stating that he is as well as ever, is attending to a large business, is travelling all over his portion of the country, that his old nervous feelings and anæmia have departed, that the bowels are moving without effort, like clockwork, and that in calibre the stools continue to be very large. He has gained much in strength, and has gradually mounted in weight until at the present time (May, 1896), more than nine months since the operation, he registers 170 pounds, or 25 more than when he came under our care, and considerably more than he had ever previously attained.

The growth removed proved, upon examination by Dr. Thomas S. Kirkbride, Jr., to be large-celled carcinoma, involving the entire circumference of the bowel. The specimen measured in length six inches, of which one and a half inches of intestine, on either side of the tumor, was free of involvement in the cancer.

A CASE OF THORACIC ANEURISM.

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[Read May 6, 1896.]

Lizzie B., colored, aged thirty-five years, married, no children, was admitted to the Howard Hospital September 4, 1894, on account of a painful swelling of the left sterno-clavicular articulation. Her family history was negative, but she gave a clear history of syphilis, contracted when she was eighteen years old, and for which she was under treatment for over a year. Since then she enjoyed fairly good health until about three months previous to her admission. During this time she suffered with severe headaches and increasing dull, boring, and neuralgic pain above the left clavicle and down the left arm and at the left sterno-clavicular articulation. Here a swelling made its appearance. These symptoms became so aggravated during the week previous to her admission that she was unable to sleep, and on account of dyspnœa she could not lie down. She was of medium height, poorly nourished, and decidedly debilitated. The swelling was about the size of an English walnut, situated a little below and over the left sterno-clavicular articulation. It was painful on slight pressure, and gave the impression of containing fluid, especially on the upper surface. No pulsation was at this time perceptible. Its base was hard and indurated. The overlying skin was unaltered in appearance. The positive history of syphilis, together with the rather rapid growth, the pain and indistinct fluctuation, and the situation of the swelling, suggested gumma, and she was therefore admitted to the surgical ward. Upon the following day, however, while prepared to incise, curette, and pack in the usual way, and while speaking of the importance of making a positive differential diagnosis between aneurism and other growths in this situation, I was startled by detecting a faint impulse on the apex of the swelling, synchronous with the pulsation of the heart. There was no bruit, murmur, or thud, and, beyond the faint impulse, no sign of aneurism. Examination of the heart showed hypertrophy, but no evidence of valvular disease. The radial pulses were full, regular, and even, and not atheromatous. Enough counter-indication to incision had been found, and the patient was treated expectantly for

some days. Absolute rest in bed was enjoined, with medium diet and gentle purgation. While the tumor gradually increased in size the patient's general condition seemed to improve. Her headaches and local pain became less severe, and she expressed herself as feeling well enough to go home. On September 15th, eleven days after her admission to the hospital, the following notes of her condition were taken:

Inspection. A rounded lobular swelling situated in the region of the left sterno-clavicular articulation, extending over the median line to the right of the manubrium. It is about the size of a lemon, and fills up the supra-sternal notch. It measures two and one-half inches in breadth by three inches in length. The clavicle is slightly elevated above its plane, and the whole left side of the chest is prominent. The tumor pulsates most markedly over the main prominence, and the pulsation is slightly expansile in character and synchronous with the heart-beat. The right external jugular vein is enlarged and pulsates, and a branch of the left jugular coursing over the tumor is also enlarged and pulsates. There is slight expansile pulsation all over the tumor.

Palpation. The most prominent part of the tumor is covered only by skin and fascia, the bony structures having been absorbed, and a portion of the growth may be compressed and pushed back into the crater-like opening. Feeble diastolic shock is felt over the tumor; expansile pulsation cannot be determined. There is no thrill, but the whole præcordia pulsates. The apex-beat is very much accentuated and felt in the left anterior axillary line on the sixth interspace.

Auscultation. A faint bruit is heard immediately under the *right* sterno-clavicular articulation and not over the tumor. This bruit is accentuated on forced inspiration and disappears on forced expiration. All cardiac sounds are accentuated, and there is good closure of both mitral and aortic valves.

Percussion. With the exception of a small spot of impaired resonance one inch in diameter, immediately to left of sternum and two inches below the apex of the swelling, the tumor dulness merges into that of the heart. Dulness does not extend beyond the right border of the sternum except at the manubrium. There is pain over the spine of the scapula on percussion, with general soreness over the whole of left shoulder. There is good pulmonary resonance right and left posteriorly, but the respiratory sounds are weak on the left side; no râles.

The urine was examined and found normal.

It became evident that we were dealing with a saccular aneurism, arising probably from the ascending or transverse portion of the arch of the aorta, with erosion through the left sterno-clavicular articulation and a portion of the manubrium, and that it had developed in such a manner as not to involve the vagus or recurrent laryngeal nerves.

The absence of many of the physical signs of aneurism, which continued to be a marked feature of this case, made it one of unusual interest. The pupils were equal, and responded normally to light. Dr. E. L. Vansant kindly

made a laryngological examination, and reported the larynx and vocal cords normal. Digestion seemed undisturbed, and there were no gastric symptoms. There was no thrill, and the expansile nature of the pulsation was not well marked. The bruit heard over the second right costal cartilage could not be referred to the sac of the aneurism, since it could not be heard over the tumor. The rapidity of growth, and the danger of rupture indicated by the thinness of the tissues over the most prominent portion of the tumor, brought up the question of operation procedure. The advisability of electrolysis with a watch-spring was considered, but was abandoned as a *dernier ressort.*

The following treatment was ordered: Absolute rest in bed. Potassium iodide, grains 5, three times daily. Venesection, six or eight ounces every three days; low diet. The patient was not bled for two days, during which time severe pain in the shoulder and left arm developed. On the third day, September 18th, she was bled eight ounces from the external saphenous vein at the ankle with great relief of this distressing symptom. Between September 18th and 30th she was bled four times, chiefly for the relief of pain, and each time with marked success. On the 30th, fifteen days later, the following note of her condition was taken:

Tumor. Since last examination the tumor has enlarged equally. It has extended upward on the neck, and there is now a well-defined sulcus separating it into parts. The right external jugular is dilated and larger than when first examined. The tumor is the seat of distinct heaving, in which the thoracic wall shares. This heaving is synchronous with systole and is more marked with expiration.

Palpation. Expansile pulsation is quite evident. The diastolic shock is better felt than at previous examinations. There is no thrill. Pulsation greatly increased during forced inspiration.

Auscultation. At point of contact of first rib with the right edge of sternum there is during quiet breathing a harsh and rather long systolic murmur which is inaudible during forced, held inspiration and expiration. This murmur is probably not aneurismal, but might be due to pressure upon the pulmonary artery. No murmur is heard in either carotid.

Percussion. Tumor gives dulness. Below the tumor there is resonance in the left second interspace; third rib, flatness; third interspace, dulness through which gastric tympany may be obtained.

Heart. Apex-beat visible in sixth interspace, and the point of maximum intensity is one inch to the right of the anterior axillary line, extending in the interspace for a distance of three inches. It is diffuse, regular, and unaccompanied by thrill.

Right border of heart dulness corresponds to right border of sternum; left border corresponds to a line drawn just without the anterior axillary line.

Auscultation of apex. First sound is long, but not so muscular as one would expect from size of heart. There is no murmur.

The second sound is well heard in the tricuspid and aortic regions, and is

obscure in character. No murmur is heard in these regions other than that described under head of tumor.

Auscultation at the angle of left scapula gives loud heart-sounds, but otherwise is negative. Respiratory murmur over right base posteriorly is well heard. Over left base the breath-sounds are weak and feeble, and when a forced inspiration is taken numerous liquid râles are heard. The respiratory murmur of left side is weaker than on the right side. The left lung seems to be compressed posteriorly and downward.

It was now evident that the aneurism was steadily increasing in size, and the prognosis became very grave. The tissues overlying the tumor were so thin that rupture seemed imminent. The sulcus across the apex of the swelling was probably due to a part of the sterno-clavicular ligament which had not been absorbed. Full doses of potassium iodide with mercurial inunctions were ordered with liquid diet, bleeding, as necessary, for pain, and absolute rest in bed.

In ten days she was taking fifty grains of potassium iodide, and one drachm of mercurial ointment was rubbed in over abdomen, chest, and arms daily. A marvellous change was seen to be taking place. The tumor was steadily decreasing in size and the patient's general condition improved daily. Once she became slightly salivated, and the mercurial was omitted for a few days. It was also found necessary to reduce the iodide to twenty-five grains daily on account of an acne. When she left the hospital, one month after this treatment had been started, there was a very marked diminution in the size of the tumor. Two weeks later, November 15, 1894, Dr. Judson Daland, who was with me when the foregoing notes were made, kindly assisted in making the following notes of her physical condition:

Upon inspection it is found that the tumor has diminished about two-thirds in size, and the impulse is correspondingly decreased. The appearance of the superior portion of the chest in front is also materially altered, the most prominent point at present being situated immediately below the left sterno-clavicular articulation, feeling like an exostosis from the manubrium, and is not painful to pressure. Immediately below this bony prominence a distinct pulsation may be felt, very like the apex-beat of a heart unaccompanied by thrill. The area would be described by a circle having a diameter of half an inch. The entire upper portion of the sternum is still prominent and bowed outward. At a point corresponding to the right edge of the sternum, on a level with the first and second ribs, a faint pulsation is felt which becomes stronger as the mid-sternal region is approached, and is strongest in the fourth interspace half an inch to the left of the left border of the sternum. Over this region a diastolic as well as a systolic shock can be felt synchronous with the heart's action, but no thrill. It can be felt outward as far as the left mid-clavicular line. The apex-beat is diffused, violent, strong, and is felt in the seventh interspace in the anterior

axillary line. The beat feels as though the heart struck the finger directly, and there is no thrill.

Percussion. A limited area of pulsation immediately below the prominence and downward for a distance of one and a half inches is flat, below which there is impairment of the percussion note for half an inch, and then comes normal sternal resonance. The right half of the manubrium is dull on percussion. In the left sterno-clavicular region there is marked dulness extending down to the second rib, at which point there is a small area of resonance. Below that there is a flatness extending down to the fifth rib. This whole area is within the left mid-clavicular line. There is resonance to the right of the sternum, excepting in the manubrial region, where normal pulmonary resonance is not met until the para-sternal line is reached. In the ensiform region there is impaired resonance continuous with the dulness immediately to the left. The lower limit of this area is marked by the seventh rib.

Above the clavicle and sternum the tumor bulges into the left side of the suprasternal notch, lying under the sternal tendon of the left sterno-cleido-mastoid. It bulges slightly over the level of the clavicle and sternum. By pressing the finger in this region back toward the cervical vertebræ one feels a ledge for a distance of one full inch, which is without pulsation, painful to pressure, and feels hard.

Auscultation. In the first interspace at the right edge of the sternum heart-sounds are heard with great distinctness. On long inspiration there is a distinct systolic murmur audible. In quiet breathing certain of the heart-beats are entirely without a murmur, and the murmur is best heard at the beginning of the expiration.

Directly over the swelling a blowing murmur is heard with systole during inspiration, but during expiration the heart-sounds are clear. This is the first time any murmur was heard over the swelling, and it is doubtless of aneurismal origin. The second sound is rather sharp. Over the pulmonic cartilage the second sound is accentuated, and somewhat ringing; no murmur. The heart-sounds are better heard below the manubrium, and at the ensiform both first and second sounds are heard equally well, the second sound being especially accentuated, but no murmur is audible.

The above examinations were all made in the standing posture.

When sitting, auscultation over the aortic cartilage reveals rather feeble heart-sounds and a faint systolic murmur. Over the swelling a distinct blowing, rather harsh systolic murmur is audible coincident with each systole of the heart. The second sound is heard immediately thereafter, and is clear over the pulmonic cartilage. The systolic murmur at the aortic cartilage has a slightly higher pitch than that over the swelling. As the stethoscope is carried downward on the left to the third interspace near the sternum the systolic murmur is best heard. Over the apex-beat no distinct systolic murmur is audible, but there is a grating sound like that produced when the pericardium becomes thickened in hearts that are hypertrophied or dilated. Over

Fig. 1.

September 15, 1894.

Fig. 2.

September 30, 1894.

Fig. 3.

October 30, 1894.

Plaster-of-Paris casts in profile.

Fig. 4.

Plaster cast made January 17, 1896.

FIG. 5

Photograph taken April 11, 1896.
Note the collar of flesh, the drooping shoulder, and the forward position of the clavicle.

FIG. 6.

Photograph taken April 11, 1896.

the third interspace, in the left parasternal line, there is a distinct blowing, wavy systolic murmur, differing markedly in quality and intensity from that heard over the swelling. There is no murmur in the carotids.

From these auscultatory signs it would appear that the systolic murmur heard over the swelling is of aneurismal origin because of location, quality, and want of distribution to the carotids. Further, the systolic murmur of different quality heard in the third interspace in the left parasternal line, having a wavy character, is probably due to compression of the pulmonary artery, as the tricuspid and mitral areas are free from murmur. The origin of the murmur heard at the aortic cartilage is doubtful. In the scapular region, near the inferior angle, a distinct systolic murmur is audible. In the axillary region no murmur is audible.

There is no difference in the radial pulses as regards rhythm or volume. The left is rather deeply situated and is hard to feel. The right is more superficial and is markedly thickened.

After leaving the hospital the patient led a quiet life, and took bichloride of mercury, one-twenty-fourth of a grain, and potassium iodide, gr. xx, three times daily.

This treatment was faithfully followed with no marked change in her general condition or in the size of the swelling during the winter and spring and early summer of 1894. In August, however, thinking that she was cured, she gave up treatment, and October 15, 1895, she returned to the hospital for relief of distressing symptoms.

The swelling had increased considerably in size and was very painful. She suffered much with headache, pain in left shoulder and arm, aggravated dyspepsia, a metallic barking cough, and on two occasions during a paroxyms of coughing she brought up a mouthful of bloody expectoration. At this time no marked changes were noted in the physical signs. She would not consent to remain in the hospital, so she was placed upon the old mixture of bichloride of mercury, one-twenty-fourth of a grain, and potassium iodide, gr. xx, three times a day.

She improved slightly under treatment until November 16th, when she was again admitted to the ward suffering intense pain over left side of neck and left shoulder, radiating down the arm. The tumor was about the size of a small lemon, rounded, somewhat sacculated, firm and tense, giving expansile pulsation, and painful on firm pressure.

She was bled on the 17th, 21st and 28th, eight ounces each time, with marked relief of pain. At the same time one drachm of mercurial ointment was rubbed in the abdomen, arms or legs, and she was given sixty grains of potassium iodide daily.

The tumor increased in size, and on December 4, 1895, her condition was as follows: The tumor is a rounded globular swelling about the size of an orange, measuring three and one-fourth inches in all directions over its surface. It bulges above the clavicle, which is raised above its plane, and it fills up the

suprasternal and supraclavicular fossæ. It is less firm and tense than at last examination and gives expansile pulsation.

The left shoulder droops, and there is general pain and tenderness on pressure.

The area of flatness may be described by a line drawn from the middle of left clavicle to fifth rib just above the nipple, from here horizontally to the mid-sternal line, then to the base of the tumor, and around it to the right sterno-clavicular articulation. Below the tumor this flatness merges into cardiac dulness, which extends to the left anterior axillary line as far as the seventh rib. Here the apex-beat can be seen and felt strongly pulsating. The first sound is long and muscular, unaccompanied by murmur. A decided bruit can be heard all over the area of the tumor flatness, and there is faint diastolic shock. A short medium-pitched systolic murmur is heard to the right of the sternum at the second costal cartilage. This murmur is transmitted into the right carotid. The second sound is sharp and accentuated.

Bronchial breathing with rough moist râles is heard under the outer half of left clavicle down to third rib. Posteriorly there is general broncho-vesicular breathing with moist râles on left side.

On right side anteriorly and posteriorly the breath-sounds are more pronounced, somewhat rough, but unaccompanied by râles.

Conclusion: A large saccular aneurism, its upper portion having eroded the bony structure. The left lung is compressed posteriorly and laterally, and the heart is pushed down and out. The aneurism probably arises from the ascending or transverse portion of the arch.

The patient improved steadily under treatment, and on December 24th was discharged in a comfortable condition. The tumor became firm and slightly smaller. The pain had ceased in the neck, arm, and shoulder.

In spite of warning she undertook housework, and January 15, 1896, she again returned to the hospital on account of pain. She improved under treatment and left the hospital at the end of ten days. She then reported weekly, and continued to do well until April 7th at 4 A.M., when she suddenly developed agonizing pain under the left axilla, which increased in severity during the day, requiring one and a quarter grains of morphine with atropine for relief. There were nausea and vomiting with painful cough. The breathing was labored and rapid. Temperature was normal. Pulse 112. Respiration 36. The physical signs could not be differentiated owing to the loud breathing. I suspected leakage from the sac into the right pleural cavity, or else a sudden dissection of the arterial walls involved and consequent increase in the size of the tumor. The chief pain was situated in the *right* axillary region. She was bled twelve ounces, and morphine and atropine were given subcutaneously for relief of pain, and the next day, April 8th, she was again sent to the hospital, and the following notes were made of her condition:

April 8, 1896. Breathing stertorous, labored, frequent, averaging 26, and

frequently interrupted by a loud ringing cough. Tumor over upper portion of sternum is the size of large orange and is more than a hemisphere. During cough it becomes tenser and larger. Impossible to judge of cyanosis. Matrix of nails are normal In sitting position with the head bent downward the chin rests upon the tumor. There is marked pulsation which upon palpation feels like the heart. The diastolic shock is marked. Expansile pulsation is well felt. The wall of the sac is made up of skin fascia and connective tissue, and has an apparent thickness of a quarter-inch. The thickest portion is in the centre. Anteriorly there is no thrill.

Auscultation: Over central portion of tumor is a strong low pitched systolic murmur mixed with the cardiac first sound. Second sound accentuated. A systolic murmur of different quality and of higher pitch is heard below the tumor to left of sternum. A murmur is heard in the left carotid. No aortic diastolic murmur is here audible. At the ensiform there is a murmurish sound of diastolic time. The apex is plainly felt as low as sixth rib outside of nipple-line, occupying an area of two inches in diameter. It is forceful, and indicates that the heart is closely applied to the chest. No thrill, no murmur, but the muscular element of the sound is increased.

Pupils symmetrically contracted, *probably due to morphine.* Pulses irregular in time, and the right pulse much smaller in volume than the left. At times the pulses are synchronous and again are not synchronous.

Lungs: Resonance over both bases. The air enters both lower lobes with the same degree of power. The breath-sound is harsh, unaccompanied by râles. Occasionally a large rhoncus is heard apparently from a compressed trachea or one of its branches. A prolonged, loud, harsh murmur is heard midway between the border of the scapula and the spinous process of the vertebra on the *right* side, and extends from the fifth to the twelfth dorsal vertebral spines. During quiet breathing but little air enters either base. Over the left scapular region there are signs of compressed lung, and the heart-sounds are plainly audible. Dr. A. W. Watson kindly made a laryngological examination and reported that he found the vocal cords normal. There is a slight deviation of the trachea to the right.

Treatment ordered: mercurial inunctions and iodide of potassium.

Two days later, April 10th, she was bled six ounces, for pain, at 8 A.M.

At 1 P.M. on the same day a violent attack of dyspnœa came on very suddenly, with sharp pain in right axillary region. The patient was deeply cyanosed, and she seemed about to die of asphyxia. A vein was immediately opened and twenty-eight ounces of blood drawn. During the bleeding the cyanosis disappeared, breathing became easy, and pain subsided. The tumor, which had been firm and unyielding, became flaccid, and patient rested easily. Later in the afternoon she slept for two hours.

May 12th. The patient has steadily improved under treatment, and, in spite of frequent venesections for the relief of slight attacks of dyspnœa and pain, she is gaining strength. She is now able to be out of bed and walk about the

ward for a few hours daily. The inunctions were pushed to salivation and then stopped. The potassium iodide has been gradually diminished until on the 5th of May she was taking none at all. At this time a tonic pill of iron, quinine, and strychnine was ordered. Her appetite is good, bowels regular, and all functions normal.

The wall of the sac seems to be firm and elastic, and about from one-half to one-quarter of an inch in thickness. The walls seem to be of uniform thickness. There is no point of marked thinning indicating danger of rupture externally.

The sac has not changed in size or appearance, but the walls have become firmer and thicker under treatment. Frequent examinations of the urine have been made during the progress of the case, with negative results.

The aneurism is undoubtedly a large one, and the fact that such extensive erosion has taken place, allowing protrusion of so large a part of it, accounts in some measure for the absence of many pressure symptoms, and, therefore, absence of pain. Pepper (*American Text-book of the Theory and Practice of Medicine*) cites two cases illustrating this point—one in which an aneurism of the ascending arch had eroded the sternum, appearing externally as a large tumor, and finally rupturing externally without having caused any decided subjective symptoms excepting dyspnœa; another in which the tumor had reached such size as to cause dulness over a large part of the thorax to the right of the sternum without causing pain.

The question of the location of the aneurism is interesting. An aneurism of the ascending arch causes erosion to the right of the sternum. In this case the erosion is of the left sterno-clavicular articulation and contiguous structures. The physical signs show that the larger part of the sac is within the thorax and to the left of the sternum. The fact that so many pressure symptoms have been and remain absent argues against the view that it is an aneurism of the transverse arch, because, owing to the small space between the sternum and the spinal column, tumors in this region usually give rise to severe pain and other symptoms of pressure. One would expect an aneurism of the descending arch to develop posteriorly.

Occasionally small aneurismal dilatations of the sinuses of

Valsalva have been noted, and Bramwell has reported one case in which a large aneurism had its origin at this point.

Gray thus describes the sinuses of Valsalva: "Between the semilunar valves and the commencement of the pulmonary artery are three pouches or dilatations, one behind each valve. These are the pulmonary sinuses (*sinuses of Valsalva*). Similar sinuses exist between the semilunar valves and the commencement of the aorta; they are larger than the pulmonary sinuses. The pulmonary valves are situated behind the junction of the left third rib with the sternum."

It has occurred to the writer that this aneurism may arise from one of the pulmonary sinuses of Valsalva. This might account for many of the peculiar features of the case, namely, the development of the sac anteriorly and to the left of the sternum; the fact that the sac fills up a large portion of the upper half of the left thorax; the absence of involvement of the vagus and recurrent laryngeal and of the sympathetic nerves; the peculiar and unusual murmurs; the absence of irregular and a synchronous action of the radial pulses; the absence of tracheal tugging.

An aneurism in this situation, unless markedly sacculated and the aneurismal opening from the vessel very small, would give rise to violent attacks of dyspnœa. This has always been a marked feature of the case, and especially so during the last few months. It is fair to presume that the opening into the sac has increased materially in size in this time.

The writer does not mean to urge this view of the case. It is mentioned only as being worthy of consideration. It seems more probable that the aneurism arises from the left lateral wall of the ascending arch, and has developed anteriorly and to the left, a portion of its upper part also bulging into the right pleural cavity just below the right sterno-clavicular articulation, and to the right of the manubrium. Also, that the opening from the aorta into the sac was at first very small, accounting for the fact that for a long time no aneurismal bruit was heard, and that the bruit which became audible later was due to increase in the size of the opening, allowing a stronger

current of blood to enter the sac. This theory is borne out by the murmur which, in the pulmonary area, was noted November 15, 1895, and which was heard most distinctly while the patient was in the sitting position, slightly bent forward, causing pressure by the sac upon the pulmonary artery.

The question of the probable origin of the aneurism is now, however, of minor importance in comparison with the actual condition of its walls and the size of the opening into the vessel from which it springs. Upon the solution of these questions should depend our decision as to the propriety of attempting to obtain coagulation of blood and the deposit of the white laminated fibrin upon the walls of the sac by means of Macewen's method. One or more strong needles are used in this method to pierce the sac in order to scratch and irritate the inner walls as much as possible. These needles may be allowed to remain in from one to four or five hours, or they may be withdrawn immediately. Macewen reports consolidation and cure in two cases (*Lancet*, November 22, 1890), one, an aneurism of the thoracic aorta and the other of the subclavian. He also reports another case of femoral aneurism in which the autopsy showed that the deposition of the white laminated fibrin was greatest where the sac irritation had been most thoroughly applied.

Weir and Page (*N. Y. Med. Journ.*, May 7, 1892) report an aneurism of the ascending aorta treated without success by this method. The needling was done three times during the first week of treatment, and as no improvement took place it was not tried again. The patient died from rupture of the sac about two months later. The autopsy showed an aneurism measuring 6½ by 8 inches and filled with a post-mortem clot. The walls were very thin and the rupture had taken place posteriorly. Nowhere was there to be seen more than a trace of fibrinous deposit and no evidences of the needling were visible.

The method is a rational one, however, and has been successful in the hands of its originator and in a few other cases. It seems to me that it is applicable only under certain conditions,

and these are a thick-walled sac, a sac in which there is only a moderate amount of expansile movement, and especially and only when the opening from the vessel is small. In order to determine the latter point in the present case, arrangements have been made to have a radiograph taken of the thorax. There is a chance of gaining important information by this means, especially if there are calcareous deposits and atheromatous changes in the walls of the aorta or of the sac. In addition a radiograph will show the changes which have taken place in the bony structures by reason of erosion and internal pressure. The writer proposes to make a supplementary report based upon this picture should it prove successful.

One word in regard to treatment. That which has been carried out in this case has proved so successful that some hesitation is felt in making any change.

A short time ago it was thought advisable to stop the mercury and the potassium iodide on account of intolerance. Since then the patient has been taking only a tonic pill of iron, quinine, and strychnine. It is proposed before returning to the mercury and iodide to try the effect of calcium iodide in full doses. This remedy has recently been used with apparent success in these cases. The result will be reported at some future time.

The points of unusual interest in the case which has been related are as follows:

1. The length of time during which the aneurism has been known to exist. It has been two years since the first symptoms appeared, and the patient has during the greater part of the time been able to be about on her feet, doing light work.

2. The almost entire absence of her usual pressure symptoms. There has been no evidence of involvement of the vagus or recurrent laryngeal nerves or of the sympathetic nerve. Occasionally there has been pain radiating over the left shoulder and down the left arm, showing that the brachial plexus has been involved.

3. The remarkable result of the therapeutic measures, as shown by the decided decrease in the size of the tumor and the

repair of the eroded bony structures at one time during the progress of the case. This point alone is sufficient to make the case worthy of record, and one which may be called unique in the history of thoracic aneurisms.

4. The decided benefit gained from venesection. On one occasion at least the patient's life was undoubtedly saved by the prompt opening of a vein and the withdrawal of twenty-eight ounces of blood.

5. The question of the origin of aneurism.

I desire to express my thanks to Dr. A. W. Booth, to whom I am indebted for the plaster models; also to Dr. Keffer. Dr. H. L. Williams, resident physician, has rendered valuable assistance in many ways, and I take the opportunity of expressing my appreciation of his work.

DISCUSSION.

Dr. Judson Daland: I have had the opportunity to examine this patient a number of times, and the case presents several interesting points. The first is the occurrence of syphilis at the age of eighteen years, treatment for a year and a half, and marked arterial changes at the age of thirty-five.

The absence of the ordinary pressure symptoms makes it clear that the aneurism involves the anterior surface of the anterior and ascending portions of the aorta. The murmurs that were present might be accounted for by pressure on the pulmonary artery. This would explain their being heard only in the upright posture.

The case is of particular interest on account of the results of treatment. The relief of pain in aneurism by iodide of potassium is well known, but rarely does one see the extraordinary reduction in the tumor which is recorded in this case. The beneficial effects of repeated venesection have been well shown, and this seems to meet the indication of diminishing intravascular pressure better than the arterial depressants that are so much employed.

The question that now interests us is as to the future treatment. It has seemed from the location of the aneurism that perhaps the communication with the aorta is moderately large, and that, as the aneurism has enlarged, it has become more sacculated. The opening through the thorax is small. It is therefore reasonable to discuss the possibility of rendering surgical aid in this case. Electrolysis and the insertion of a wire have been spoken of,

and upon the whole I believe them undesirable. I should like to bring up the discussion of the feasibility of the suggestion of Macewen to introduce a needle and carefully scratch the lining membrane with the idea of bringing about coagulation of the blood. In the absence of any surgical relief death must take place in a few months in the ordinary course of events.

Dr. F. A. Packard: I would ask Dr. Shober if he has tried nitroglycerin during the attacks of pain, or, where there was cardiac excitement, the use of veratrum viride. In the cases of aneurism that I have seen where the paroxysmal pain has not been relieved by nitroglycerin, veratrum viride has relieved the discomfort.

There is one other remedy which I have used in aortic aneurism which I believe to be of value, and that is calcium chloride. It has been proven that the time of the coagulability of the blood can be reduced one half by the administration of calcium chloride. In two or three cases this drug has seemed to thicken up the sac, and there has been improvement in the symptoms.

Dr. Shober: In reply to Dr. Packard I would say that venesection has always been followed by such marked relief of symptoms in this case that I have not found it necessary to use veratrum viride or nitroglycerin. The suggestion of calcium chloride is a valuable one, and I am strongly inclined to give it a trial.

A STUDY OF THE ACCIDENTAL RESTORATION OF THE DISLOCATED SHOULDER AND HIP—WITH INFERENCES UPON THE MECHANISM OF DISPLACEMENT.

By OSCAR H. ALLIS, M.D.,
SURGEON TO THE PRESBYTERIAN HOSPITAL.

[Read June 3, 1896.]

Probably no one ever ventured before a medical audience under the circumstances that present themselves to-night. Many adduce facts, or what they consider facts, to prove a theory; but I am in the somewhat strange dilemma of one who starts with conjecture and hopes to establish a theory with arguments based upon hypotheses, and before an audience trained in the critical, skeptical school of medicine.

You will notice that I am reversing the usual method of thought; we usually catch the hare, then cook it. I begin with accidental *restorations* and try from a study of these to adduce a theory of displacement.

Case I.—A lad with recent dislocation of the shoulder was taken to Dr. Richard Dingee, of Newportville. As a preliminary measure, but without the slightest intention of reduction, the doctor gently raised the elbow from the side when the head was returned with a snap.[1]

[1] The subsequent history of this case is full of interest. Twice after this the lad was brought to Dr. Dingee, and the restoration effected, as in the first instance, by simply elevating the elbow. In the fourth occurrence of displacement, restoration was attempted by a strong physician who resorted to the Astley Cooper method of heel in the axilla. After a long and fruitless effort the father of the lad would permit of no further proceedings, and taking his son went in search of Dr. Dingee. He found him at last and told him what had happened. The doctor immediately went out to the carriage in which the lad was still sitting, took hold of the elbow, raised it from the side when the restoration was effected. A

Case II.—A young adult dislocated his shoulder in a convulsion. He applied to Dr. Hamilton, who failed with chloroform to restore it. The reduction took place during sleep the following night.[1]

I will now present two displacements:

Case III.—A laborer, after a day's work at the gas works, went in bathing. In "striking out" he dislocated his shoulder for the first time. It was restored by Dr. Rodger Keys, of this city.

Case IV.—An amateur boxer dealt a blow at his antagonist, which, failing of its intended aim, dislocated his shoulder for the first time.

In the study of these cases there is one point to which I would call attention: In the first, dislocation and reduction were accomplished when the patient was awake. In the second, both dislocation and reduction were unconsciously produced.

Another point to which I would call special attention is that the swimmer's and boxer's arms were away from the body at the instant of dislocation. I would also have it noted that in Case I. the arm was being abducted when it suddenly returned to the socket.

The theories regarding dislocation of the shoulder that have stood for centuries are that they are due almost invariably to extraneous influences, such as a fall upon the outstretched hand or elbow, or a fall upon the shoulder; that the dislocation is due to the violence of the fall; but it will be noticed in the two cases I have cited no external influence is apparent.

Authors have noticed that dislocations occur during abduction, and many theories have been advanced to explain them. Stimson observes that the humerus after it reaches the horizontal position will, if carried higher, strike against the acromion, and through it as a fulcrum hyper-abduction will effect displacement. But it is not clear to my mind that this is the mechanism of dislocation in the act of swimming. Or take

little later the father moved his family to Philadelphia. The dislocation again occurring, the lad was taken to one of our hospitals and reduction unsuccessfully attempted. The father then took his boy with him to Newportville, when Dr. Dingee, raising the elbow from the side, restored the dislocated head.

[1] Hamilton on Fractures and Dislocations. Fourth ed., p. 567.

the case of one leaning with his hands against a wall. No dislocation follows the act, but he sneezes and out comes a shoulder. A case most pertinent, but one I would not select for illustration if I could find another as good, occurred in the practice of the late Dr. Collins: A married woman received the approaches of her husband reclining and with both her hands clasped beneath her head. In the height of the sexual orgasm both shoulders were dislocated. In neither of the cases last cited is it clear that the dislocation took place from a still further elevation of the shoulders at the moment of excitement.

In the study of dislocations we can, I think, learn more from the deliberate and conscious state of mind and body than from violence and dispatch, and in such as I have been able to find the arm was abducted, but not beyond its customary and usual functions, when a new force arose and the dislocation effected.

Stimson says that when the shoulder is well abducted, and sometimes when it is not high enough to feel the effect of the acromion pressure, that dislocation will take place. This he explains on the ground that the acromion may be depressed by the action of the deltoid, and also that the pectoralis major may sometimes contribute to the displacement.

Whatever truth may lie in the theories advanced by authors, none to my mind account for the excess and preponderance of dislocation internal to the triceps tendon over all others. Authors subdivide dislocations inward into subglenoid, subcoracoid, subclavicular, as if they were the result of different agencies; but all these are upon the pectoral side of the triceps tendon. Ninety-nine out of every hundred dislocations of the shoulder will be upon the same side of the socket; but when we seek for an explanation of this in accidental cases we find the same result from going in swimming, or boxing, or cracking a whip, falling on the elbow or outstretched arm, or carrying a basket on the head.

A conclusion to which one would naturally arrive is that if the head is dislocated by a fall upon the outstretched hand or elbow the dislocation would take the direction of the vulnerat-

ing force and be upward and outward. And, as falls upon the outstretched arm are given as among the most frequent causes of dislocation of the shoulder, the upward and outward should be a frequent variety of dislocation. But somewhat strangely, and quite difficult of comprehension, we learn that this injury produces dislocation inward and downward. It is, indeed, quite inexplicable that a fall upon the outstretched hand and a fall upon the shoulder should both produce dislocations inward and downward.

The preponderance of dislocations upon the inner side of the socket demands an explanation, and to my mind there is but one, and that is the action of the pectoralis major and latissimus dorsi muscles. In this matter I differ in degree from Stimson, for, while he considers the action of the pectoralis contributes to the occasional dislocation of the shoulder, I give the action of these two muscles *as the principal factor in producing the majority of dislocations* upon the pectoral aspect of the joint.

In the discussion of this point I shall assume that all inward dislocations of the shoulder take place during abduction. Unless the objector grants me this premise, I shall ask him why he abducts as a cardinal manœuvre in his modern principle of reduction? Take, for instance, the swimmer: In "striking out" (with advanced arms) he dislocates his shoulder. What does it? Ans. The action of the pectoral and latissimus muscles. How do they do it? Ans. Their insertion is just below the socket. The swimmer's arm and forearm constitute a long and powerful lever. In the effort to displace the water, *i. e.*, to propel his body forward, the power (muscles) acts between the weight (water) and the fulcrum (capsule). The power proves to be stronger than the capsule, and the head is drawn out of the socket in the direction of the muscles. In the case of the man with hands against a wall or the woman referred to, the same principle would explain the result.

There are cases in which the arm is carried strongly away from the body as in abduction. The man's arm represents the long arm of the lever, the violence with which it is raised represents the power; but where shall we look for the fulcrum?

This, in my judgment, may be found in the pectoral and latissimus, made tense to resist the sudden abduction.

A principle even more interesting than that involved in dislocations is seen in the two cases cited. In the first, Dr. Dingee only raised the elbow. In the second the reduction took place during sleep. The mechanism of restoration is probably identical in both. In the first, the *weight* of the forearm and arm was removed, the elbow gently raised, *i. e.*, supported; the reduction took place during abduction. Probably the reduction in the unconsciousness of sleep took place while the forearm and arm rested on the bed in an easy abducted position. Hamilton says that the mere abduction of the elbow is a favorite method of his for restoration of the shoulder. He says that this relaxes the deltoid and supraspinatus; and Stimson says that it relieves the pressure of the head against the glenoid fossa which is induced by the weight of the limb. The abduction certainly is favorable to reduction; but even after Dr. Dingee had abducted the limb, if we examine into the course of reduction we will find that it took place against gravity. After Dr. Dingee had elevated the elbow, if an assistant had grapsed the shoulder in both hands with fingers and thumbs clasped about the dislocated head, the reduction would have been expected; but in neither case was there a friendly hand to lift the head into the socket. It is not enough to say that this position of abduction relaxes the deltoid and supraspinatus, for in the relaxed state if they did not oppose reduction, certainly they did not as relaxed muscles contribute to restoration. What then did restore the head? I answer I do not know unless the muscles situated above the head did it. If the limb, freed of all restraint and locking, by abduction, *with its weight transferred to the hands of the physician or resting upon the bed;* if, I say, the head was not lifted into this position by the action of the biceps through its long head and the supraspinatus, I am entirely at loss to explain it.

My list of accidental restorations of the femur is short and much less satisfactory than those of the shoulder. It may, indeed be questioned by some whether either of the cases were

dislocated; and though I cannot prove it, I am satisfied that no other condition than dislocation and restoration could account for the *suddenness and completeness* of the loss of function and its equally *sudden and complete* reclamation.

Case V.—A miller, loading bags of flour, slipped and fell backward with a bag upon him. He was unable to rise; and was carried home in a helpless and suffering condition. His physician pronounced his injury a laceration of the large muscle of the back. His pastor learns of his misfortune, calls to console and assure him that his family shall not suffer during his long prospective illness. On the following Sabbath when left alone, and feeling no pain, he is seized with a strong desire for a pitcher of water upon a table near by. Cautiously crawling to the edge of the bed, then getting a little out, he reaches a chair and ventures toward the pitcher. Suddenly the the chair gives way and he falls with all his force upon the bare floor upon his buttocks. He experiences instant relief, rises, dresses himself, and walks to the church, much to the astonishment of his pastor, who furnishes this sketch.

Case VI.—An engine running at the rate of twenty miles an hour is derailed, and the engineer hurled with such force against a fence-post near by as to break it. From this moment the engineer is lame, the injured limb being one and a half inches shorter than its fellow. He returns to work, after a long and painful absence, *but can only work a half-day, and that every second day*. When he sits he rests only on one buttock. Twenty months later he slips on an icy pavement. Limbs instantly restored to symmetry; in three weeks returns to *full work*, and *sound ever after*.

If for the sake of argument these be regarded as complete dorsal dislocations, what was the mechanism of restoration? The early and still quite prevalent theories of dislocations of the hip are that the head is driven out of the socket by a fall upon the extended knee or foot; and with such a view of the conditions it would be a sufficient explanation to say that each patient struck upon a projecting ledge, which knocked the head into the socket. But when we think that the head of the femur in each case was covered with pantaloons, drawers, skin, superficial fascia—the fascia lata and the great gluteus—and that the lucky projecting ledge must be three or four inches high to hit the little round head of the femur and drive it up a couple of inches into the socket, the theory of direct displacement becomes a little unwieldy.

As a substitute I offer the following: Take the man falling upon the ice. The first act in falling is to jerk up the thighs, and the man falls heavily upon his buttocks. His pelvis stops suddenly, but how about his flexed thighs? These cannot stop, the momentum which they have acquired causes them to fly outward, while the attached legs drag the thighs downward in extension. Thus we have a succession of movements almost identical with those recommended by Reid and Bigelow for reduction by manipulation. The first, *i. e.*, flexion, makes the head descend until it is below the socket; the second, *i. e.*, the swinging outward of the knee lifts the head to a level with the socket; and the third, *i. e.*, the descent of the knee, carries it into the socket *through the influence of the remnant of untorn capsule, the ilio-femoral or Y-ligament.*

EXHIBITION OF SPECIMENS.

Dr. Allis presented the following specimens: 1. Impacted Fracture of the Neck of the Femur, with History.

Dr. Allis said: The first[1] of the two specimens of fracture of the neck of the femur which I present this evening was given to me by Dr. Franklin Mathews, in whose name I will present it to the College. The history of the case is as follows: Dr. Mathews was called to see a woman, aged seventy years, who had slipped upon the ice and injured her hip. A policeman had helped her home, and Dr. Mathews was summoned. The advanced age, the nature of the fall, her sudden and total helplessness in the affected limb, with shortening and eversion, convinced Dr. Mathews that his patient had a fracture of the neck of the femur, but he made no attempt to obtain crepitus nor applied a fracture dressing of any kind.

At the request of Dr. Mathews I saw the case, and confirmed his diagnosis by noting the relaxation of the fascia lata above the great trochanter. By mutual agreement no apparatus was applied; the patient was not informed of the gravity of the injury, and was encouraged to get out of bed as soon as she liked. This she was assisted in doing in a few days, and spent her time in sitting out of bed instead of reclining in bed. By degrees, in the course of a couple of months, she began to walk about with crutches, then with a single cane, and, finally, it became a matter of indifference whether she used a cane or not. She died three years after the accident. Through the kindness of Dr. Mathews I was able to make an autopsy, and can now present you with a sawn section of the head and neck of the femur, which shows an impacted or imprisoned fragment. I do not think the capsule had been injured in the original accident. The mechanism of the fracture is a fall upon the great trochanter when the shaft is rotated outward. This brings the posterior part of the neck of the femur against the outer rim of the acetabulum. This makes a fulcrum of the rim; while the force is applied to the trochanter the resistance comes from the capsule; the result is that the lever gives way at the point of the greatest stress, *i. e.*, at a point pressed by the fulcrum. The admirable recovery is a good proof of the wisdom of not disturbing the fragments to establish a diagnosis through crepitus.

Dr. Mathews in reply to a question from Professor Brinton said: The amount of shortening did not exceed three-quarters of an inch. The old lady walked very well and could walk several squares without fatigue. An interesting feature of the case was that she suffered no pain whatever, from

[1] Mütter Museum, No. 1397,006.

first to last. No special shoe was worn; but there was considerable curvature of the back, which had existed from adolescence up, and did not follow the fracture.

The second specimen of fracture of the neck of the femur is from a case with a different history.[1] In this case there was also a fall, but the patient an aged female, died in a few days without rallying from the shock. By the violence of the injury the head of the bone was burst or cracked open. The impaction of the neck resembles that of the one just described.

2. Fracture of the Neck of the Femur, partly Intra- and partly Extra-capsular, with Transfixion of the Capsule, and Accompanied with Flexion of the Femur at the Hip.[2]

The most interesting and valuable specimen I have ever seen I now have the pleasure of showing to you and of presenting to the College. Its history is as follows: A couple of years ago, while I was at work at the University in studying dislocations of the hip, I secured a body to a dissecting-table and made rectangular flexion of the thigh upon the pelvis, with rotation inward, by means of the leg flexed at right angles to the thigh; while rotating I heard something snap, and found upon letting go that the limb would not come down. What I had produced proved to be a fracture of the neck of the femur with *flexion and inversion*. It recalled those cases cited by authors of fracture of the neck of the femur with rotation inward for a few days, in which the limb after a few days or weeks became everted. The explanation usually given is that some of the fibres of the gluteus minimus draw up the bone and twist the shaft so as to produce inversion of the foot. I was not satisfied that this was the correct explanation, and this was an opportunity for testing it. I, therefore, made a careful dissection and found that the fracture, which was partly intra- and partly extra-capsular, had ruptured the capsular ligament at the back above the division of the ischio-capsular ligament, and that the lower fragment had slipped out of the rent and could not be restored on account of a projecting spiculum which was a part of the shaft and would not re-enter the rent in the capsular ligament. The entire shaft below the fracture was thus controlled by a spicule of the shaft which was transfixing the capsule.

Dr. J. H. Brinton: I would like to ask a question with regard to the first specimen, which I regard as a very important one. Was it a pure intra-capsular or extra-capsular, or a mixed fracture—one partly intra- and partly extra-capsular? I also would like Dr. Mathews to state the amount of shortening that he found? I ask this because I have now a similar case in a man, aged sixty-five, in which there is half an inch shortening, with firm union and excellent power of locomotion at the end of seventeen weeks from the time of injury. In my case there is nearly half an inch inward transverse shortening by Morris's mode of measurement.

[1] Mütter Museum, No. 1897,0065.

[2] Mütter Museum, No. 1397,100.

CASE OF BULLET IMBEDDED IN THE TISSUES OF THE NECK, LOCATED BY SKIAGRAPHY.

By ROBERT G. LE CONTE, M.D.

[Read June 3, 1896.]

I SUBMIT the following case as an evidence of the practical value of Röntgen's discovery, as it shows clearly how precisely one may cut for bullets which cannot be located by any other means:

E. J., aged twenty-six years, colored, laborer, was admitted to the Pennsylvania Hospital on the evening of May 31, 1896, with a gunshot-wound of the neck. The history of the injury was as follows: He had been cleaning and loading a 32-calibre revolver, and handed it to a companion seated next to him. As he was leaning forward, with his elbows on his knees, the revolver was accidentally discharged at a distance of four feet.

The bullet entered the neck on the left side, about an inch above the clavicle, in the region of the scalenus anticus. The probe entered for a distance of one and one-half or one and three-fourth inches toward the middle of the neck, and was there firmly arrested, and no manipulation or change in the position of the patient would advance it further.

The patient was unable to move the left arm toward or away from his side, or to raise it from the bed, but he had perfect control over the forearm and hand, although his motions were slow and deliberate. There was no skin anæsthesia of the arm or shoulder. The act of swallowing gave him severe spasmodic pain in the throat (in the swallow, as he expressed it). There was no change in the voice, and talking was not painful.

From the above symptoms it was concluded that the bullet had bruised or severed one of the spinal nerves which form the brachial plexus, and had lodged alongside the pharynx or œsophagus. Palpation revealed nothing, except that there was tenderness from the wound of entrance to two inches beyond the median line of the neck on the right side. With such indefinite guides as to the locality of the bullet it was deemed advisable not to make any attempt at extraction.

The next day, June 1st, the patient was sent in the ambulance to Dr. Goodspeed at the University of Pennsylvania, who kindly took the skiagraph here shown.[1]

As will be seen, the bullet lies on the right side of the neck on a plane with both clavicles, and also on a plane with the body of the seventh cervical vertebra. It gives no idea of its depth in the neck, except a relative one, and that is, the nearer the object is to the plate the sharper its definition.

The skiagraph was received on June 3d, and an hour later the patient was etherized. Even knowing the position of the bullet, palpation still revealed nothing. The choice of incision lay between entering the neck anteriorly, in a line with the bullet as it appears in the picture, displacing the vessels to the outer side, or of going in at the side of the neck behind the sterno-mastoid muscle. The latter mode was chosen; the skin and fascia incised parallel with the sterno-mastoid, the finger separating it from the scalene until the body of the seventh cervical vertebra could be felt through the longus colli muscle. The finger was then crooked directly forward alongside of the œsophagus, a small pocket of the pus broken open and the bullet found within it. It was extracted, the cavity washed out, and packed with iodoform-gauze.

An examination of the bullet gives evidence of its having passed through or, at least, been sharply deflected by bone. My theory would be that it had passed through the anterior portion of the body of the fifth or sixth cervical vertebra, and, as it emerged, being nearly spent, it was deflected downward and forward by the fascia of the long muscle of the neck.

DISCUSSION.

Dr. John H. Brinton: I rise to add my testimony to the value of the method adopted to locate the bullet in this case. Through the kindness of Dr. Le Conte I was present at the operation. I have seen very many cases of troublesome bullet-wounds, and never was one more difficult; but guided by the radiograph, the operation was skilfully performed by Dr. Le Conte. I have never seen a search for a hidden bullet carried on with more boldness than in this case, evidently influenced by the certain knowledge of the whereabouts of the foreign body, and the conviction that it surely could be found. I realized what an immense boon had been given to us in this process, which throws light in dark places.

[1] The picture was taken with the man lying down, the light in front and the plate at his back. Your right side is also his right, as you are apparently looking through him from his back—*i. e.*, you are in the position of the sensitive plate.

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NOTE ON INFANTILE SCURVY.

By JOSEPH LEIDY, Jr., M.D.

[Read June 3, 1896]

The subject of infantile scurvy as a special disease has received but passing attention at the hands of American authors. To William Perry Northup, of New York, the credit is due of having been the first American writer to treat the affection as a special disease, though the subject has received rather liberal treatment at the hands of a number of Continental writers. Heubner, of Leipzig, credits but eleven of fifty cases which he tabulated as occurring outside of England, to the United States. Staar had seen five cases during the sixteen months previous to December, 1895. The writer observed a notable increase in the number of cases in his clinic at the Pennsylvania Hospital during the past year, in addition two in private practice, in all nine.

The disease, if we may so term it, appears to be a not uncommon one, and the increase may be actual, as was the case with the clinical material at the Pennsylvania Hospital, or apparent, owing to the old classification, which included such cases under the head of rickets, purpura hemorrhagica, and hereditary syphilis. It is the purpose of this note to treat infantile scurvy as a distinct and separate disease. It occurs in the families of the wealthy as well as among the poor; indeed, the most pronounced case occurred in a family of ample means, where more than usual care and attention were given their offspring.

Until recently, the major portion of the profession was inclined to view with satisfaction and a considerable degree of

approbation sterilized milk as the food *par excellence* for infants, and a well-justified substitute for the various proprietary infant foods. The unusual frequency of infantile scurvy and the relation which various infant foods, including sterilized milk, bear as a causative factor, suggested the presentation of the following brief note:

Definition. Infantile scurvy may be defined as a disease characterized by malnutrition, developing insidiously, attended with general debility, anæmia, ecchymoses in various parts of the body, principally the lower extremities and mucous membranes of the mouth, sponginess of the gums going on to ulceration in severe cases, general muscular weakness amounting to immobility in the lower extremities, going on to pseudo-paralysis, attended with swelling about the joints and excessive tenderness along the lines of the long bones, rarely terminating fatally when early placed under proper treatment. The symptoms vary according to the severity of the attack, etiologically holding an important relation to the deprivation of fresh foods, and are almost immediately ameliorated by the administration of a proper diet. This, the so-called therapeutic test, becomes of great value in diagnosis.

Etiology. Predisposition to rickets, scrofula, must of necessity increase the tendency to the production of the disease. That in the various proprietary infant foods, and in the sterilization of milk, we lack, in certain cases, a certain something which is needed for a proper nutrition of the tissues, there can be no doubt.

Symptoms. All the subjects present the evidences of malnutrition, anæmia varying in degree. The red blood-corpuscles are decreased in number, with a corresponding diminution in the percentage of hæmoglobin, the white corpuscles varying slightly. The blood-count of the cases under observation ranged from 2,200,000 to 3,800,000 c.cm.; hæmoglobin 50 to 70 per cent. Microscopically, the red blood-corpuscles presented an irregular appearance as to size, with no other notable change. In one case the red blood-corpuscles showed slight pigmentation.

Heart and circulatory apparatus. Hæmic murmurs were present in four instances, varying with the amount of anæmia. Pulse usually rapid; temperature ranged between 99.8° and 101.5° F.; respiration averaged slightly above the normal.

Lungs. Negative, except in two cases, in which fine moist râles were heard over both lungs posteriorly; no hæmoptysis.

Mucous membranes. The condition of the gums was variable, from slight sponginess to severe ulceration. In one case the swelling of the gums caused overlapping, completely obscuring the front teeth from view; bleeding was occasioned by the slightest irritation. In other cases simply petechiæ showing a tendency to fuse was noted, with ecchymoses in the fauces and soft palate. In one case, where the gums were treated by the attending physician with a solution of nitrate of silver, ulceration with exuberant granulation formed along the upper gums, completely obscuring the four upper teeth, and presenting a gangrenous appearance, the slightest touch provoking hemorrhage. In milder cases simply sponginess of the gums existed. Bowels showed a tendency to looseness, though constipation existed in one case; in none was blood passed in the stools, though the condition has been noted by different observers.

Kidneys. Urine high colored; sp. gr. 1018 to 1026; traces of albumin in three cases, with hæmaturia as a later manifestation. In one case hyaline and blood-casts were observed. The age of the children made a careful observation in most instances unsatisfactory.

Nervous and muscular systems. There was general debility, languor, peevishness, and irritability. Weakness in the lower extremities was marked, with a decided tendency to pseudo-paralysis, to a much less degree in the arms. All favored the recumbent posture, with the limbs drawn up and flexed. When sitting would throw the body forward, resting upon the thighs; this posture was characteristic. Electrical reactions normal; knee-jerk minus. In but two cases were there enlargements or swellings about the epiphyses; there was considerable tenderness over the tibia and along the course of the

femur. As all the patients presented a group of symptoms almost identical, I will occupy but a few moments with brief notes on several of the more interesting, presenting the severest and mildest types.

Case I.—G. G , aged about ten months, of healthy parents, was presented at the clinic in the Pennsylvania Hospital with the following record: Family history negative; no history of syphilis, tuberculosis, rickets, or alcoholism; parents unusually healthy. Patient was one of four children, all healthy and strong; child bottle-fed. Mother noticed, five weeks previously, food did not appear to agree, though persisted in its use. One week previous to bringing the patient to the hospital noticed the gums were red and swollen, and that the child cried out when the legs were touched or moved. Physician who saw the case pronounced it rheumatism, and so treated it. On admission: temperature 100°, pulse 126, respiration 24; presented the appearance of advanced malnutrition, anæmia; lips and ears bloodless; the anæmia suggested that produced by hemorrhage; patient irritable, restless, and unable to sit up. When attempt is made sits with body resting forward and cries to be placed on its back; indisposition to move the lower extremities; arms are slightly affected; gums ulcerated, overhanging two upper teeth, bled upon the slightest irritation; shows a disinclination to take milk through the nipple. There are ecchymotic spots on lower gums; several petechial spots over tibia; bowels constipated; urine high colored, otherwise negative.

Blood examination: 2,600,000 red blood-corpuscles, with one white to 200 red. Hæmoglobin 55 per cent.

Heart and lungs: Hæmic murmurs, with a few moist râles over both sides posteriorly.

Muscular system: Lower extremities painful on motion, with great tenderness about both knee-joints and along the shaft of the femur. Treatment consisted in *Pasteurized* cow's milk, orange-juice, and beef-juice. Progress was slow. The parents were above the average in intelligence, and though we were assured that proper care was taken in the preparation of the food, we insisted upon a specimen being brought us for examination. The mother then acknowledged that though she was using the orange and beef-juice, she was also using a prepared food suggested by a friend—Liebig's. She agreed in the future to carry out the directions given; in less than one week from the time Pasteurized cow's milk was used the patient began to improve; the gums ceased to bleed and in ten days had healed perfectly. With massage of the lower limbs, motion and full power returned. In three weeks from the first visit to the hospital the patient was discharged, practically well, with no evidence of previous illness, except slight anæmia, for which small doses of citrate of iron were administered. The diagnosis of rheumatism and the rapid amelioration of acute symptoms under change of diet are the points of especial interest in this case. Such is the type of case which occurred

during the prolonged administration of one of the well-known and frequently used proprietary infant foods.

Case II.—The following notes are of a case in private practice and one which was under constant observation:

R. D., aged eleven months, of healthy parentage, one of three children; came with the history of having rheumatism. The symptoms were entirely referable to the lower extremities, which were painful to the touch, though no evidence of swelling could be detected. When the soles of the feet were pricked the child would make partially successful efforts to draw the limb up; pressure along the femur or over the knee-joints occasioned considerable pain. Petechial spots were present over both tibiæ and on the *lower* gums. There was slight anæmia. Heart and lungs negative; bowels loose. As the patient was upon sterilized milk, diet was continued, and in addition beef and orange-juice; but little progress was made. At the end of ten days the gums were decidedly spongy; the limbs not at all improved, owing to the tendency to diarrhœa and considerable gastro-intestinal irritation. Pasteurized milk with Fairchild's peptogenic powder was substituted for the sterilized milk, in addition to beef and orange-juice, which was continued. Without it were possible to witness the rapid progress toward recovery which this case made, I fear any account would be incredible; suffice to say that in four weeks, with the exception of the anæmia, the symptoms had entirely disappeared, the patient had regained entire control of the lower extremities, is now increasing in weight, and the anæmia rapidly disappearing. Rheumatism was again the error in diagnosis in this case and again a point of considerable interest, as well as the rapid amelioration under change of diet rich in fresh food. The child had been brought up on sterilized milk. Of the nine cases which I have had an opportunity of studying, six were fed upon one of the proprietary infant foods, three upon sterilized milk, all bottle-fed.

Diagnosis. From the insidious nature of the affection, the history of the cases, and the character of the symptoms there can be no difficulty in reaching a correct diagnosis. To recapitulate: general debility, anæmia, sponginess and bloody extravasation of the gums; petechiæ and ecchymoses upon the lower extremities when present; the enlargement about the joints and along the shafts of the long bone, and the apparent loss of power, muscular rather than nervous in origin, in infants fed upon any of the proprietary foods or sterilized milk preparations, present a picture almost characteristic; the slight fever frequently entirely absent, becomes an important point in the differential diagnosis. From *acute rheumatism:* the swelling in scurvy being above and outside of the joint proper, in rheu-

matism confined to the synovial sac; and finally the *therapeutic test*, justly so-called, which is invariably attended by the rapid amelioration of the symptoms.

From *rickets:* The history of the case, the absence of evidences of rickets and the subsidence of the symptoms under treatment, all go to exclude the diagnosis of an affection, the symptoms of which are usually of prenatal origin; in those cases where scurvy occurs in children previously the subject of rickets, the diagnosis might appear difficult, but, even here, the rapid disappearance of the acute symptoms under treatment would aid us in eliminating a distinctly constitutional disease.

Of treatment sufficient has been said. The use of a diet rich in fresh foods, of a character suitable to the age of the child, beef and orange-juice, with the use of Pasteurized, or what has been termed humanized, milk for infants, has proved ample in our hands. Medicinally the use of minute doses of citrate of iron internally, massage, hot and cold douches to the lower extremities are of use where the progress is slow in those cases of psuedo-paralysis.

In presenting this brief note on infantile scurvy, it is to be hoped some interest will be aroused in an affection which until recently received but little attention as a *special* disease of infants, and the important relation which sterilized milk has as a causative factor in addition to the various proprietary infant foods. Until this time I can find no reference to a case of infantile scurvy occurring during the administration of Pasteurized milk.

Owing to a rapid recovery in all the cases under observation, no opportunity was given for examining, microscopically, post-mortem, any of the lesions; those observers who have had such an opportunity, however, describe well-marked lesions, principally of a hemorrhagic character, occurring in all the tissues and organs of the body.

DISCUSSION.

Dr. Arthur V. Meigs: For a good many years past I have had little opportunity to see cases of this kind, but what Dr. Leidy has said recalls to my mind conditions which I used to see at the Children's Hospital as long ago as 1880. There used to come to the dispensary children with conditions that puzzled me. My recollections are rather vague, but I remember cases that impressed me as resembling the scurvy seen in sailors returning from a voyage, who have been deprived of fresh vegetables. These conditions are more likely to occur in a dispensary practice than among the better class of private practice.

It is often difficult to make a distinction between cases of scurvy and purpura. In fact, scurvy seems to be nothing but a special form of purpura arising from a special cause. I think I have seen several cases of scurvy in infants and young children; but it has been so long ago that I cannot say positively that they were of the kind which Dr. Leidy has described. As regards the sterilization of milk as a cause, it may possibly be so; I do not recall seeing such a result from its use. I have always opposed the sterilization of milk as an ordinary practice.

Dr. F. A. Packard: It seems that infantile scurvy is most frequently mistaken for articular rheumatism; but this mistake will be less frequently made if it is borne in mind that in scurvy the effusion is subperiosteal and the pain is above the joint, but not in the joint as it is in rheumatism. In two cases I have seen, the pain upon pressure was above the joint and clearly obviated the danger of making a diagnosis of rheumatism. Lately several cases have been reported, especially in British medical journals, in which hæmatoma of the dura mater occurred in infantile scurvy, giving rise to a fatal coma or other nervous phenomena.

I think that Dr. Leidy's experience has been very unusual in the large number of dispensary cases among his series. Most authors agree in stating that it is a disease of the rich, the children of whom are fed with prepared foods, while the children of the poor are fed on the breast for economy's sake.

Dr. Leidy: I was induced to present these brief notes upon infantile scurvy, owing to the fact that but little attention has been given to the subject, except by those more specially interested in diseases of children, and hence has remained unrecognized by the majority of the profession, and since several of the cases have occurred while the little patients have been on a sterilized milk diet, which by many is still considered the food *par excellence* for infants; again, the error in diagnosis is frequently made —several cases were treated for acute rheumatism before the affection was recognized; and, lastly, the value of the therapeutic test so-called, the patient rapidly recovering when placed upon a proper diet.

A CASE OF SECONDARY CARCINOMA OF THE BONES; MULTIPLE FRACTURES; ASSOCIATED DUODENAL ULCER; POLYURIA.

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[Read June 3, 1896.]

A. B. C., male, aged thirty-four years; civil engineer; born in Maryland, of gouty parents.

There was no specific history and no hereditary specific taint. The habits of the patient had always been good; he was a hard, energetic worker, exposed, as division engineer on the railroad, to all kinds of weather; sometimes working twelve and eighteen hours in twenty-four, frequently with clothing wet all the time, and often without food.

The patient was generally in good health, with the exception of dyspepsia. The dyspepsia was of the acid variety, on account of which he took enormous doses of bicarbonate of soda. He carried the drug in his pocket and literally took handfuls at a time for relief.

Four years ago he began to suffer from what was alleged to be rheumatism. A short time previous to this he had two of the right upper molars extracted, and from their site a hard mass developed. Later, nodes developed in different parts of the body, under the periosteum.

He visited Carlsbad in 1889, and was told he had periosteal rheumatism. He removed to Philadelphia in the fall of 1889; he was treated for rheumatism and put on a very low diet.

I saw the patient January 7, 1890. He was extremely anæmic, and there was some emaciation and great prostration. The red blood-corpuscles numbered 2,500,000. He suffered extremely from acid and flatulent dyspepsia; the bowels were regular. He had grave polyuria. There was a loud systolic murmur at the aortic orifice, transmitted into the vessels of the neck. There was extreme pulsation of the aorta at the root of the neck and in the abdomen. The pulse was frequent, quick, and bounding. Lungs normal; liver normal in size; no cerebral or spinal symptoms.

The node in the right upper jaw resembled an epulis. It had not recently increased in size, and caused him no inconvenience. It was as large, in circumference, as a quarter of a dollar, half an inch thick, hard, and very red in appearance. It would swell irregularly and bleed very much, after which it would be reduced. Sometimes the bleeding occurred on slight provocations, strong sucking action of the mouth causing it.

The following is the order of development of the nodes:

1. On right upper maxilla (in the mouth).
2. On the head of the right tibia.
3. On metacarpal bone of right hand.
4. On right ulna, at its upper portion.
5. On right femur, at its middle portion.
6. On left tibia.
7. On the sixth rib, right side.

The nodes on the extremities were occasionally the seat of considerable pain and tenderness, and, according to the report of the patient, varied in size from time to time.

The anæmia improved, as shown by various blood-countings which have been mislaid. Polyuria continued.

February 17th. Urine, 3520 cubic centimetres; specific gravity, 1007; urea, 41, or 14,432 grammes per day; phosphates, 0.07, or 2.464 grammes per day; uric acid, albumin, and sugar, none; reaction acid.

The strength improved somewhat, and early in the summer he went to Atlantic City. The patient had been bedfast all winter, however, and during this time, and while at Atlantic City, experienced several fractures.

The patient was again seen by me at his home in Philadelphia, September 19, 1890. His polyuria had improved somewhat. Thirst, however, was still extreme. The cardiac dulness was much increased; apex in fifth interspace; mitral murmur marked; increased dulness in the course of the aorta. Liver dulness was increased upward one inch. There was epigastric pain and tenderness, apparently not increased by food, but paroxysmal.

Analysis of urine of September 23, 1890. Amount, six pints; slightly acid; straw color; specific gravity, 1005; no albumin or sugar; pus in very slight quantity; phosphates in very great abundance.

The volume of urine passed each day, from February to October, 1890, was constantly above the normal. The lowest quantity noted was on September 25th, the amount being two quarts and four ounces. Generally, it was between four and five quarts, occasionally, however, rising to six and even seven quarts in twenty-four hours.

On the 25th, the patient had a profuse hemorrhage from the stomach; the blood was bright in color, not mixed with food, and the gastric hemorrhage was followed, in four hours, by a large discharge of black blood from the bowels. Another hemorrhage occurred on the succeeding day, causing the intense anæmia and profound exhaustion that his condition would predis-

pose to. Red blood-corpuscles reduced 900,000. The usual symptoms of anæmia developed; fever and delirium were particularly noticed. October 3d, another hemorrhage took place, followed by death in six hours.

The last two hemorrhages above noted were predicted by the patient on account of his sensations. He experienced a sensation of trickling of blood a little to the right of the median line in the epigastrium. This continued about an hour, attended by increasing weight and fulness in the left upper quadrant and followed by the hæmatemesis.

After the first hemorrhages there was œdema of the face and extremities, and a hypodermic injection was followed by local tenderness and a subcutaneous hemorrhage about the point of puncture. During this time, without an anodyne, the patient suffered much from local pain.

Autopsy. Permission was given to examine the stomach alone, and remove a portion of the mass from the clavicle.

The stomach was dilated; it contained blood. The duodenum was the seat of an ulcer one-half millimetre in diameter, with hard, rounded edges, and which had perforated the walls. Adhesions surrounded the ulcer and the floor was made up of pancreatic structure. The hemorrhage was from a branch of the pancreatic artery, which could be seen in the ulcer.

The portion from the clavicle was examined by Professor Allen J. Smith, now of Galveston, Texas. He reported that the structure was that of a carcinoma, the primary source of which was found in the epithelial structures about the teeth. In the accompanying note the structure is described by Professor Smith:

"Examined fresh teased portion from rib in a solution of sulphide of sodium of a specific gravity 1026, with a bit of methyl-blue added to fix the cells. I find among the cells the accompanying forms. I believe all those marked *a* to be epithelial, and the condition hence, cancer. The others appear to me to be embryonal blood-corpuscles; *b* being probably a nucleated white cell, and *c* nucleated red corpuscle, the nucleus gradually fading out as indicated by letters (c, c, etc.). I have attempted to keep the relative sizes, from Zeiss D. D. oc. 4. In the case of the clavicle there are undoubted evidences of cancer, of a flat-celled type, and the tumor showing in it is made up largely of such cells." (Letters refer to a pencil-sketch sent with the report, but which could not be reproduced here.)

There are several features of interest in this case, and first of all, the associated pathological conditions, *multiple carcinoma of the bones, duodenal ulcer, and polyuria.* The association of the first is purely accidental, no doubt, and without significance; the last may have been dependent upon either one or the other of the former conditions.

1. I cannot in an extended research find any mention of the

association of polyuria with carcinoma of the special variety we have to deal with. Naturally we were led to believe a secondary growth must be present in the pancreas or in the region of the fourth ventricle of the brain. In both of these situations the growth has given rise to diabetes insipidus. The symptoms do not allow one to think a cerebral growth was present, and the post-mortem failed to reveal the presence of a growth in the pancreas. Gregoire, in his paper on "L'Urine dans le Cancer,"[1] does not refer to polyuria in cancer.

In all probability, the excessive discharge occurred because of the tissue at fault rather than because of the lesion.

Since the case has been under observation I have studied many cases of rhachitis, in which an excessive flow of urine was observed. One infant was almost continuously urinating, and the soaked diapers yielded a fluid, the specific gravity of which ranged, at different times, from 1000½ to 1003.

2. The Duodenal Ulcer. This was not suspected during life, as there were no symptoms pointing to its presence. Dyspepsia plagued the poor fellow many years, and the acidity from which he suffered was spoken of in the notes. He never suffered gastric pain until nine days before death. The ulcer was an old one, and, undoubtedly, without the usual symptoms until the last ten days of illness.

The excessive acidity alone might have been taken as indicative of an ulcer, either gastric or duodenal. It was not practicable to employ the usual tests of the gastric contents.

When discovered at the autopsy it was thought there was carcinoma about the edge of the ulcer, but further investigation failed to disclose its presence.

3. I have asked Dr. Wharton, who attended to the surgical requirements of the case, to describe the various complications.

Notes of Dr. Wharton. I saw Mr. —— in March, 1890, and found him suffering from a fracture of the left femur in its middle third. The patient stated that the bone gave way while sitting in a chair, and the fracture was

[1] F. 1248, 1883-84, No. 15.

the result, as he thought, of a sudden spasm of the muscles of the thigh. I found, upon questioning him, that, a few months before, he had suffered from a fracture of the right clavicle, which had resulted from a sudden turning in bed. On examination I found a large mass of elastic callus about the seat of fracture in the clavicle, the union being firm enough to allow of free use of the arm of the injured side.

The fracture of the femur was treated by median extension, and lateral support was given by bran-bags and splints, and, by the end of four weeks, union had so far taken place that the limb could be lifted in the dressing without causing any displacement of the fragments, and without causing him any pain.

At this time, while moving himself in bed to change his position, the right femur suddenly gave way in its middle third at a point corresponding with the thickening of the bone previously mentioned. This fracture was treated as the previous fracture of the femur, and, after a few weeks, seemed to have made some progress toward union. The patient, a short time after the fracture of the right femur, one evening, while raising his body by means of his arms, suddenly felt his right arm give way, and, on examining him a few hours afterward, I found an oblique fracture of the right humerus about its middle third. This was treated upon an internal angular splint, with external splint of binders'-board, and in several weeks there was some union at the seat of fracture.

The patient was at this time sent out of the city for the summer, and I saw him once during his absence from the city, and examination showed that there was some improvement in the condition of all the fractures.

Upon the return of the patient to the city, in September, I examined him and found that the fracture of the humerus was quite firm, although the union was not bony, but was of sufficient firmness to permit him to use the arm moderately; the fractures of the femur were not so firmly united, and that of the left femur showed a large amount of swelling in the region of the fracture, and there was more motion in the seat of the fractures of the femur than at the time of my previous visit.

Upon post-mortem examination the fracture of the clavicle, on section, showed that there was no true bony union, and that the fragments were surrounded and held together by a mass of fibrous and spongy tissue; a like condition existed at the seat of the fractures of the humerus and at both fractures of the femur. All the bones were in a softened condition and could be readily cut with a knife or scissors.

The case proved to be one of secondary cancer of the bones, and the softening and fragility of the bones were very marked, as evidenced by the ease with which the bones fractured upon slight provocation.

As regards the prospect of firm union of fractures in cases of this nature, my experience has been that there is no true bony union, and that the union which does occur is simply that which results from the development of a new

growth at the seat of fracture. I have had under my care, within a few years, two other cases of secondary cancer of the bones, in both of which the disease resulted from cancer of the breast. In one of these the clavicle was fractured in turning in bed, and in the other case the femur was broken in the middle of its shaft by a similar movement, and in neither case was there any union at the seat of fracture up to the time of the death of the patients.

Remarks. It is well known that carcinoma of the bones is rare, as compared with sarcoma. Markoe[1] treats the subject most extensively. Geissler's[2] paper is most interesting, and is based on the modern views of carcinoma. It is not well to go back into the literature of the disease. Isolated cases are reported as carcinoma, when, on the face of them, they are undoubtedly sarcoma.

The disease is always secondary. The primary growth appears to be most frequently in the breast. All authorities point to the necessity of exercising great care in finding the primary growth. The prostate, the testicles, the thyroid, the œsophagus, the pharynx, and the penis may be the seat of small growths. Billroth disclaims the reported cases that appeared to originate in the lower jaw, the anterior surfaces of the tibia, or the lymphatic glands of the neck, for the close proximity of skin or mucous membranes would invite invasion from either of these primarily affected structures. In one of Bryant's cases a scar in the heel became carcinomatous, and thence extended to the os calcis.

The primary growth may be present without symptoms. Frequently the primary growth atrophies. There is almost always a curious disproportion between the primary seat and the metastasis. The former is small, the latter very extended. Thus, in one of the cases under Delafield's care (quoted by Markoe) the primary scirrhus of the breast was very small, very hard and fibrous, while nearly all the bones were affected. In Perl's case of cancer of the vertebra the primary growth was found to be in the anterior surface of the stomach—a hard, cicatricial cancer.

[1] Diseases of Bone, 1872.

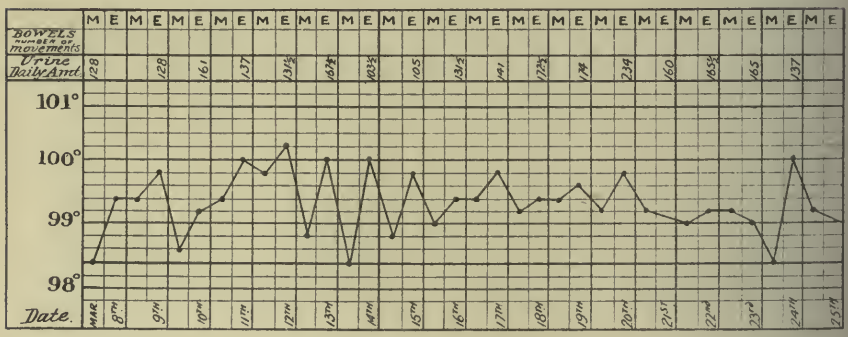
[2] Archiv für klinische Chirurgie, 1893, vol. xlv. p. 704.

Von Recklinghausen (1891) points out that the prostate may be the unsuspected primary seat in many cases. The naked-eye appearances of this gland, when removed, often fail to disclose its character.

Von Bergmann insists on extending the search. One of his cases was remarkable. The case was of thirty years' standing. A tumor of the liver was presented. It was thought to be an echinococcus, and was to be operated on. On examination of the testicles, two small, adherent, knotty swellings were found, which, the patient said, had been there a long time. The post-mortem later verified the diagnosis.

Geissler, to whose article I am indebted for much ofthe above, reports a case from the Berlin Clinic which originated in the bladder. The scapula became involved secondarily, three months after bladder-symptoms arose. The nature of the lesion in the bladder was very obscure, and not until operative measures were resorted to did they discover the character of the lesion.

CHART 1.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BOWELS NUMBER OF MOVEMENTS
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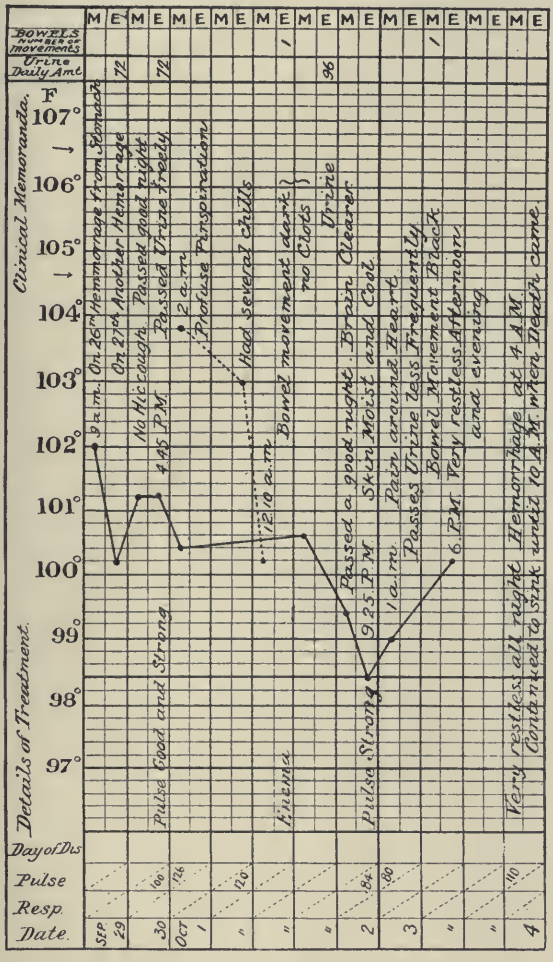
101°
100°
99°
98°
Date.
MAR. 8TH 9TH 10TH 11TH 12TH 13TH 14TH 15TH 16TH 17TH 18TH 19TH 20TH 21ST 22ND 23RD 24TH 25TH

The temperature during the course of the disease was slightly above normal, varying from 99° to 100° F. Thus, in March, from the 9th to the 28th, the range was, as the accompanying chart indicates, not materially different from other periods. The chart also indicates the amount of urine passed in twenty-four hours. After the hemorrhage from the stomach, the tem-

perature rose; it was, no doubt, due to the anæmia. The second chart of anæmic fever is of interest, and is therefore appended.

CHART 2.



DIAGNOSIS. It can readily be seen that, in certain diseases, as cancer of the vertebra, the diagnosis of which is often difficult, the detection of the primary growth is of pronounced aid in the recognition of the disease in question.

It can also be seen that, conversely, if carcinoma is found in a portion of an excised tumor, connected with bone and removed for diagnosis, obscure symptoms connected with internal organs may be explained.

In the case we have under discussion, had a portion of the primary growth been removed for examination, the diagnosis of syphilis or rheumatism would not have been made, and the man spared the expense and fatigue of foreign travel. There was no ground upon which such diagnosis could have been built.

In a review of the cases of carcinoma *versus* sarcoma of the bones, we find that the latter usually occurs earlier in life, although the former may be seen as early in rare cases. The duration of carcinoma is greater than that of sarcoma. The metastatic growths are more abundant in the former than in the latter.

SUMMARY. Male, aged thirty-four years. Primary *carcinoma* involving superior maxilla; secondary carcinoma of bones; multiple fractures; diagnosis during life, syphilis and rheumatism; exact diagnosis of carcinoma could have been made during life if a section had been removed. Duration four years.

Death from *hemorrhage* due to *duodenal ulcer*. Ulcer not suspected during life until the occurrence of hemorrhage. *Diabetes insipidus*.

A GRAPHIC STUDY OF TREMOR.

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PROFESSOR OF CLINICAL MEDICINE IN THE PHILADELPHIA POLYCLINIC; PHYSICIAN TO THE PHILADELPHIA HOSPITAL.

[Read November 4, 1896.]

THE work embodied in this report was undertaken at the suggestion of Dr. S. Weir Mitchell, whose hearty co-operation and aid it further had throughout. Among the objects of the investigation was the determination (1) whether or not a demonstrable tremor exists in healthy individuals; (2) whether or not any relation or gradation exists among various kinds of tremor; and (3) whether or not differing forms of tremor present distinguishing characteristics.

The subject of tremor has always attracted considerable attention, especially in a clinical way, and a number of interesting graphic studies have been made. Most of these observations, however, have dealt only with the tremor associated with diseased states, particularly with regard to the form and frequency of movement and the influence of rest and action, or passivity and activity. With the exception of Peterson,[1] none has, so far as I am aware, undertaken an analysis of the character of the movements, and it was hoped that this object might be fulfilled in the present study; but our efforts in this direction have not been entirely successful.

The first difficulty encountered consisted in a want of a suitable apparatus, as none of those previously described

[1] Journal of Nervous and Mental Disease, February, 1889; New York Medical Journal, October 11, 1890, p. 393.

appeared sufficient or available for the purposes of the investigation. A number of investigators[1] have used two tambours connected by tubing, which transmits the movement imparted to the one to the second. Others[2] have substituted a rubber ball for the first tambour. Still others[3] used various forms of sphygmographs. Von Kries[4] used a steel spring to which a glass style was attached. Ughetti[5] employed an apparatus resembling the scales of commerce. This consisted of a vertical arm connected with a horizontal arm carrying a stylus. The vertical arm was supported by two springs and provided with a toothed dial, on the face of which a needle registered the amount of pressure employed. The elaborate apparatus employed by Warner[6] permitted only the enumeration of various kinds of movements of the hands and its component parts. It consisted of (1) an arrangement of rubber tubes to be attached to the hand, one tube to each finger or moving part. These were connected by means of pieces of thin conducting tubing with a set of tambours. (2) A frame supporting the recording tambours and electric signals. (3) An electric contact-making tambour, a modification of the Marey tambour adapted to the purpose of actuating (4) an electric counter.

On looking over the ground the conclusion was reached that the most suitable as well as the most simple apparatus would be one based upon the principles governing the construction of instruments already in use for the graphic study of various physiologic phenomena—*e. g.*, the pulse-beat, the respiratory movements, etc. The instrument devised for the purposes

[1] Debove and Boudet: Archives de Neurologie, 1880-81, tome i. p. 191. Marie: Thèse de Paris, 1883. Horsley and Schaefer: Journal of Physiology, 1886, pp. 96, 111. Dutil: Thèse de Paris, 1891. Fernet: Des Tremblements, Thèse de Paris, 1892. Filliatre: Archives de Neurologie, September, 1894, p. 161.

[2] Marie: Loc. cit. Wolfenden and Williams: British Medical Journal, May 19, 1888.

[3] Grashey: Archiv für Psychiatrie, 1885, B. xvi. p. 857. Huber: Virchow's Archiv, B. cviii. p. 45. Peterson: Journal of Nervous and Mental Disease, February, 1889, p. 99. Dana: Medical News, December 17, 1892.

[4] Archiv für Physiologie, 1886.

[5] Rivista sperimentale di Frena, vol. xix., Fasc. 2, 3; Revue Internationale de Bibliographie Médicale, Pharmaceutique et Vétérinaire, 1893, No. 24, p. 451.

[6] Journal of Physiology, vol. iv. p. 160.

of this study is, to all intents and purposes, nothing more than an inverted sphygmograph upon a large scale. It consists of a tripod about 4 inches high, mounted upon a base of iron to give it stability, and surmounted by a metallic ring 4 inches in diameter, over which is stretched an elastic membrane. Attached to one of the legs of the tripod, by means of a sliding ring and clamp-screw, is a horizontal metal bar about 2½ inches long, which can be raised or depressed. This rod in turn carries, also by means of a sliding ring and clamp-screw, a short vertical rod an inch in length, which can be slid forward and backward. The upper extremity of this vertical rod is bifurcated for the reception of a light horizontal bar which is pivoted upon either branch, and to which the inscribing or registering needle is attached through the intermediation of a prolongation of aluminum. Attached to this bar by means of a sliding band is a slender rod an inch long, jointed below to the sliding band and above to a small flat button about ⅜ of an inch in diameter, which is glued to the under surface of the elastic diaphragm.

It will be seen that every movement imparted—*e.g.*, by the fingers—to the elastic membrane will be transmitted to the registering needle, and in magnified degree in inverse proportion to the length of the proximal arm of the lever formed by the arrangement of the constituent parts of the instrument. By this means it has been possible to demonstrate and record movements that would have escaped detection by the means ordinarily employed. On the other hand, the sensitiveness of the instrument precluded its use in cases in which the movements were wide in range or wildly inco-ordinate. Under these conditions resort was had to the tambours in ordinary use, which permitted further of simultaneous observations of the two sides of the body or of two or more different parts. The new apparatus, while possessing advantages over those previously in use, is not entirely free from objection. With it, as with others, it is difficult, if at all possible, to make the conditions always exactly alike. Thus the tension of the elastic membrane is variable under differing conditions, while the co-

operation of the patient is required, both mentally and physically. Besides, in an investigation like this, it is difficult to eliminate extraneous influences, such as are related to rest and activity, sleep, the emotions, hunger, the taking of food, stimulants, tobacco, etc.

In the endeavor to afford as nearly as possible some basis of comparison, an attempt was made to fix the amount of pressure that should be exercised in placing the tremulous part, usually the fingers, upon the elastic diaphragm. This was successfully accomplished by the use of a scale constituted of lines radiating from a centre corresponding to the fulcrum of the lever contained within the instrument. This was mounted by the side of the needle, and as a given weight was placed upon the diaphragm of the apparatus the level to which the needle descended was noted, and for the individual observation represented a known amount of pressure.

To distinguish our apparatus we have designated it a tremograph, and the tracings secured with its aid tremograms.

The experiments ordinarily were conducted by having the subject place the fingers, especially the index, middle, and ring fingers, upon the diaphragm and exercise a measured amount of pressure, thus one, two, three, or four ounces, as the case might be. By means of a plate fastened beneath the membrane to one of the legs of the tripod it was possible to have the subject approximate the fingers, above, with the thumb, below, in a prehensile attitude, without, however, bringing them into contact, and again with a measured amount of pressure. This attitude is not incomparable with that assumed, for instance, by the watchmaker in the execution of fine movements, or by the surgeon in the performance of delicate operations.

In using the tambours one of these (the transmitter) was either placed upon the lap of the subject with the fingers gently applied, or was held between the partially flexed fingers and thumb, while the other (the receiver), through the intermediation of the style, was brought in relation with the smoked paper mounted upon the revolving kymographic apparatus.

In the course of this study upward of 1100 individual observations were made on more than 100 different persons. Nearly all of the subjects were derived from the Infirmary for Nervous Diseases—physicians, surgeons, nurses, patients—the last almost exclusively from the large clinical service of the Infirmary, generously placed at my disposal by the attending physicians, Drs. S. Weir Mitchell, Wharton Sinkler, and Morris J. Lewis. A number of cases came from the private practice of Dr. Mitchell, and a number of professional colleagues kindly volunteered their services for the study of the tremor of the healthy. Several watchmakers were studied through the courtesy of Messrs. Bailey, Banks & Biddle; and a number of men from the Old Men's Home afforded material for the study of the tremor of the aged.

While the results reached are not entirely satisfactory, in consequence partly of the inherent difficulties of the investigation and partly of mechanical deficiencies, they have still developed a number of interesting facts.

It was definitely determined that a tremor could be demonstrated in healthy persons. This was to have been expected, as every muscular movement is made up of a series of alternate contractions and relaxations, occurring ordinarily with such frequency as to escape detection with the unaided eye. If anyone have doubts upon this subject, let him attempt to hold steadily in his hand a glass of water or other fluid and view the surface. In this connection I am reminded of an incident related of a skilled surgeon noted especially for his steadiness of hand, who, when spoken to upon the subject by a junior colleague, was unwilling to admit that his hand shook. Placing his fingers in a vessel of water, the rippling disturbance of its surface at once proved the contention of the younger man. If a photographic reproduction of the waves of motion generated under these conditions could be made, it might prove serviceable in such a study as has here been undertaken. As the frequency of contraction and relaxation diminishes, the tremor increases. The occurrence of tremor in

healthy persons is further supported by the testimony of other observers.[1]

In a general way it was found that the frequency of movement bore an inverse relation to its extent—that is, the wider the range the smaller the number of movements. This observation is of the utmost significance, as it largely negatives the likelihood of distinctiveness for the tremor of any disease, the extent of movement under any circumstances being extremely variable and influenced by various conditions. Corroboration of this attitude is found in the statement of Fernet[2] that the more frequent the muscular contraction occurring spontaneously or induced electrically the less pronounced the tremor. Further confirmation of this position is found in the statement of Huber[3] that the rate of contraction varies in different muscles of the same individual and in the same muscles on different days. Gowers[4] also found considerable variations in the movements of different parts of the body of the same individual. Peterson[5] observed that in cases of paralysis agitans the movements were fewer in number as they were coarser, and that the rate of vibration differed in different parts of the body and in the same part on different days.

Those acts were performed with the least tremulousness which the subject was mostly in the habit of executing. Thus the watchmaker, the laryngologist, the eye-surgeon displayed the less movement in the exercise of less pressure than in that of more, while those unaccustomed to delicate manipulations displayed more movement under the same conditions and less under the reverse.[6] The tremor was in general not appreciably influenced by the slight variations in pressure made. Ughetti[7]

[1] Debove and Boudet: Loc. cit. Horsley and Schaefer: Loc. cit. Beaunis—quoted by Wolfenden and Williams: Loc. cit.

[2] Loc. cit.

[3] Loc. cit.

[4] Diseases of the Nervous System, 1888, p. 1001.

[5] Loc. cit.

[6] Whilst the tremor of most morbid states is increased by intended movement, and that of the healthy state is probably induced by the same influence, it seems that in the trained hand the movement may, under these conditions, be reduced to a minimum, as a result of extreme delicacy of co-ordinative adjustment, either natural or acquired, and it may further be that some sense of security or guidance is derived from the performance of a well-defined and accustomed voluntary movement.

[7] Loc. cit.

records, on the contrary, that in his observations the amplitude of the oscillations increased with the amount of pressure.

The extent of movement was ordinarily smaller when the thumb and fingers were approximated in the attitude of prehension than when the fingers alone were applied to the tremograph. This is probably due to the sense of support afforded by the former attitude and to the inhibitory influence of a well-defined voluntary act. In general, also, the number of movements in the same observation was smaller as registered with the aid of the tambours than when shown by the tremograph. This is probably owing to the greater delicacy of the latter, as the finer movements are lost in transmission through the tambours. The mental attitude of the subject seemed to have an appreciable influence upon the tremogram, the more intelligent and the more careful displaying greater movement under the same conditions than the unintelligent and the indifferent. Familiarity with the necessary manipulations on the part of the subject also brought greater steadiness.

The greatest frequency of movement computable was 10.7 per second, and was observed in a healthy individual and also in a hemiplegic; the smallest was 3, observed in a case of posterior spinal sclerosis. The general average of movement among all of the observations was 6.7. There was a good deal of uniformity of average under varying conditions when large numbers of cases were studied. On the other hand, the differences were more conspicuous among individual cases.

In a number of conditions, and especially in cases of paralysis agitans and of the spinal scleroses, the movements of symmetric parts of the two sides of the body seemed to be practically synchronous (even when differences in the range of movement existed), in so far as comparative observations could be made. When any difference existed between the movements of the two sides this was slight and not constant.

Most of the movements displayed a want of regularity or

rhythm. This was especiably noticeable in the slighter and ill-defined movements, as those of health. Those of paralysis agitans particularly, as well as those in a case of diffuse sclerosis suggestive of paralysis agitans, displayed, as a rule, a *tendency* to regularity and rhythm. The occurrence of secondary or dicrotic waves, and even of tertiary waves, was often noted in tracings from cases of paralysis agitans. It was also observed in two cases of multiple sclerosis, one of which was suggestive in some respects of paralysis agitans. This peculiarity, which has also been noted by Wolfenden and Williams[1] and by Peterson,[2] will account for the wide variations noted in some cases. Of course, the number of movements is greater when these secondary waves appear and less when they are suppressed. In this connection Wolfenden and Williams go so far as to contend that the special characteristics that distinguish clinically the various forms of tremor are to be traced to two causes: 1. An exaggeration of the amplitude of the normal vibration. 2. The fusion of vibrations, which has the effect of producing a relatively slow tremor, generally of a rate corresponding to half that of the normal vibration.

It was hoped, among other things, that this study would aid in the differentiation between multiple sclerosis and paralysis agitans, but in this respect we were disappointed. Often easy, the diagnosis between these two conditions is at times exceedingly difficult. There is reason for believing that the two affections are not unrelated both clinically and pathologically. At any rate, it is probable that too much importance has been attached to the influence of rest and of voluntary effort respectively upon the tremor in the differentiation. In this connection it must not be forgotten that unequivocal cases of paralysis agitans may be unattended with appreciable tremor —either on account of its real absence or because of its concealment by the rigidity so often present.

We have been able to demonstrate graphically a clinical

[1] Loc. cit. [2] Loc. cit.

observation made by Dr. S. Weir Mitchell, viz., that in cases of paralysis agitans forcible extension of a finger of the shaking hand will temporarily restrain the movement of the hand. That this interference is not merely mechanical is shown by the fact that the tremor soon recommences, even though the extension of the finger be maintained. Besides, similar restraint was sometimes observed when a finger of the opposite hand was extended. Some slight inhibition was at times induced by an effort of the will. Following the reduction in range of movement under these conditions, there was usually an increase in the frequency. Closure of the eyes and of the opposite hand and the prick of a pin seemed to exercise only a transient disturbing influence, though occasionally an inhibiting effect was appreciable. In a case of choreal tremor application of an Esmarch bandage to the arm was attended with a reduction in the range and rate of movement in the corresponding hand.

I present herewith a summary of the results of our study (Table A), and append also a tabulation from various sources of the results obtained by previous investigators in the study of tremor (Table B). These tables show the wide variations of movement under all conditions, and strengthen the opinion already expressed that special forms of tremor are not characterized by special frequency of movement (and it is probable that they present as well no other distinguishing feature).

In conclusion I think the following propositions are justified:

1. All muscular movements are made up of a series of elementary contractions and relaxations in alternation which may be appreciable as tremor in conditions of both health and disease.

2. The differences between different tremors are of degree rather than of kind—*i. e.*, no one form of tremor is distinctive of any one disease or group of diseases.

3. No definite relation exists between one form of tremor and any other.

4. The frequency of movement is in inverse ratio to the amplitude, and *vice versa*.

5. Habitual movements are performed with greater freedom from tremor than unusual movements.

6. There is no material difference between the movements of the two sides of the body, except as related to proposition 5.

TABLE A.—SUMMARY.

	TREMOGRAPH.						TAMBOURS.					
	Right.			Left.			Right.			Left.		
	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.
Health	10.0	4.5	7.0	10.7	4.0	6.7						
Senility	8.5	5.2	6.8	8.0	5.2	6.6						
Paralysis agitans	8.9	5.2	6.3	8.5	5.0	6.3	7.3	4.5	5.5	7.8	4.5	5.5
Multiple sclerosis	8 5	7.3	7.5	9.3	6.1	7.3	7.6	4.5	6.4	8.0	4.0	6.0
Diffuse sclerosis	7.0	6.0	6.7	7.0	6.0	6.6						
Posterior sclerosis	5.0	3.6	4.4	5.3	3.0	4.4						
Postero-lateral sclerosis	...	...	6.0	...	...	6.0						
Hysteria	10.0	5.4	8.0	9.5	4.9	7.3	7.5	6.4	7.0			
Neurasthenia	9.0	4.5	7.1	8.9	4.8	7.0						
Exophthalmic goitre	10.0	4.7	7.4	9.0	4.4	6.9						
Writer's neurosis	8.5	5.4	6.9	8.8	5.9	7.6						
Melancholia	7.3	4.7	6.3	5.9	5.5	5.6						
Right hemiplegia	...	...	...	5.5	4.0	4.8	...	...	...	10.0	8.3	9.2
Left hemiplegia	10.7	9.0	9.6	6.0	5.5	5.6	10.5	9.0	9.8	...	...	8.5
Chorea	5.1	5.0	5.1	...	...	5.0	...	...	3.9	4.0	3 6	3.8
Goitre	8	5.5	7.3	10.0	5.0	6.4						
General neuritis	7.5	5.2	6.5	7.5	5.2	6.6						
Chronic alcoholism	9.0	8.0	8.5	8.5	8.0	8.3						
Pendulum-tremor	...	...	...	...	...	...	...	...	...	6.2	5.8	6.1
Arsenical poisoning	7.5	7.4	7.5	...	...	6.8	...	...	...	...	...	4.9
Torticollis[2]	...	...	...	...	...	...	...	...	...	...	...	7.6

Head.	Max.	Min.	Aver.
[1] Lateral,	4.6	3.3	4.4
Ant.-post.,	3.9	3.3	3.6

Head.	Max.	Min.	Aver.
[2]	7.9	7.6	7.8

TABLE B.

	Health.	Senility.	Paralysis agitans.	Multiple sclerosis	Diffuse sclerosis	Posterior sclerosis	Postero-lateral sclerosis	Hysteria.
Dana	10	5	3–6	.....	.....	8–8.6	.....	5
Peterson	.....	.....	3.5–5.6	4.6–6.3	.....	.....	.....	7.6–7.8
Wolfenden and Williams	.....	5.5	5.1	5 8	.....	.....	.....	.....
Dutil	.....	4–5.6	5–6	4–5.5	.....	.....	.....	5.5–7.5
Fernet	.....	.....	.....	3–5	.....	.....	.....	.....
Gowers	.....	.....	4.8–7	6–7	.....	.....	.....	.....
Charcot	.....	.....	4–5	7–10	.....	.....	.....	5–7
Marie	.....	4.5–5.5	5	.....	.....	.....	.....	.....
Féré	.....	.....	.....	.....	.....	.....	.....	.....
Horsley	.....	.....	.....	.....	.....	.....	.....	.....
Ewald	.....	.....	5	.....	.....	.....	.....	.....
Grashey	.....	.....	4.1–5.3	.....	.....	.....	.....	.....
Huber	.....	.....	3.4–5.6	.....	.....	.....	.....	.....
Eshner	6.9	6.7	5.9	6.8	6.8	4.4	6	7.4

	Neurasthenia.	Exophthalmic goitre.	Writer's neurosis	Melancholia.	Right hemiplegia.	Left hemiplegia.	Chorea.	Goitre.
Dana	10	8–9.5	.....	.....	.....	.....	.....	.....
Peterson	7.4	8.7–12	.....	.....	.....	.....	.....	.....
Wolfenden and Williams	.....	10.8-11.5	.....	.....	.....	.....	.....	.....
Dutil	.....	8–9.5	.....	.....	.....	.....	.....	.....
Fernet	.....	.....	.....	.....	.....	.....	.....	.....
Gowers	.....	.....	.....	.....	.....	.....	.....	.....
Charcot	.....	.....	.....	.....	.....	.....	.....	.....
Marie	.....	8–9	.....	.....	.....	.....	.....	.....
Féré	.....	.....	.....	.....	.....	.....	.....	.....
Horsley	.....	.....	.....	.....	.....	.....	.....	.....
Ewald	.....	.....	.....	.....	.....	.....	.....	.....
Grashey	.....	.....	.....	.....	.....	.....	.....	.....
Huber	.....	.....	.....	.....	.....	.....	.....	.....
Eshner	7.1	7.2	7.3	6	7	8.4	4.5	6.9

	General neuritis	Chronic alcoholism.	Pendulum-tremor.	Arsenical poisoning.	Torticollis.	Myelitis	Progressive muscular atrophy.	Hemiplegia with epilepsy
Dana	.....	6.2	.....	.....	.....	5–6	5	4.8–5
Peterson	.....	8.5–11	.....	.....	.....	.....	.....	.....
Wolfenden and Williams	.....	.....	.....	.....	.....	.....	.....	.....
Dutil	.....	8–9	.....	.....	.....	.....	.....	.....
Fernet	.....	.....	.....	.....	.....	.....	.....	.....
Gowers	.....	.....	.....	.....	.....	.....	.....	.....
Charcot	.....	.....	.....	.....	.....	.....	.....	.....
Marie	.....	.....	.....	.....	.....	.....	.....	.....
Féré	.....	.....	.....	.....	.....	.....	.....	.....
Horsley	.....	.....	.....	.....	.....	.....	.....	.....
Ewald	.....	.....	.....	.....	.....	.....	.....	.....
Grashey	.....	.....	.....	.....	.....	.....	.....	.....
Huber	.....	.....	.....	.....	.....	.....	.....	.....
Eshner	6.6	8.4	6.1	6.4	7.6	.....	.....	.....

	Hemiplegia, embolism.	General paresis.	Mercurial poisoning.	Saturnine poisoning.	Delirium tremens	Lateral sclerosis	Hereditary tremor.	Quinine	Epilepsy
Dana	10–12	.....	.....	.....	.....	6	8–9	10	8.5–8.8
Peterson	.....	.....	.....	.....	5.6–6.8	6	.....	.....	10
Wolfenden and Williams	.....	.....	.....	.....	.....	5.5	.....	.....	.....
Dutil	.....	8–9.5	.....	.....	.....	.....	.....	.....	.....
Fernet	.....	.....	5	6	.....	.....	.....	.....	.....
Gowers	.....	10–12	.....	.....	.....	.....	.....	.....	.....
Charcot	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marie	.....	.....	.....	.....	.....	.....	.....	.....	.....
Féré	.....	.....	.....	.....	.....	.....	.....	.....	10
Horsley	.....	.....	.....	.....	.....	8–10	.....	.....	.....
Ewald	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grashey	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huber	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eshner	.....	.....	.....	.....	.....	.....	.....	.....	.....

DISCUSSION.

Dr. F. P. Henry: I would ask Dr. Eshner whether he has made any observations of tremor in Graves's disease? It has been stated by Marie that the tremor in that affection is more rapid than in any other, amounting to nine oscillations per second, and that, consequently, it is highly diagnostic. In fact, he goes so far as to say that he would base the diagnosis of Graves's disease upon the coexistence of tachycardia and this peculiarly rapid tremor, even in the absence of exophthalmos and goitre.

Dr. Eshner: The results of observations in some cases of Graves's disease are exhibited in the summary that forms a part of my paper. As has been stated, I do not think that the frequency of movement of the tremor is characteristic of any disease. As I have pointed out, tremor can be shown to exist in health, sometimes with greater frequency of movement than in exophthalmic goitre. In our own observations we have found as many as ten movements to the second in a healthy person, and the same number also in a case of exophthalmic goitre. In a case of left hemiplegia there were ten and seven-tenths, and in a case of hysteria there were ten movements in the second. From the tracings I am unable to say whether or not there is anything distinctive of the tremor of exophthalmic goitre, but there appears to be nothing of this character in the frequency or range of the movements.

Dr. Henry: I cannot help thinking that there is something characteristic in the tremor of Graves's disease, even on ordinary inspection. Its rapidity, the comparatively slight amplitude of its oscillations, and, above all, the fact that it is universal and not limited to particular parts of the body, seem to me to render it highly diagnostic.

Dr. Joseph W. Warren: I should like to ask a question in reference to the results recorded by the instrument described, whether the tremor indicated is not merely a pressure-tremor? It does not show the tremor of the hand as such, or of the whole arm as such. Some ten years ago Dr. Bullard tried to design an apparatus of this kind, and, with the aid of Dr. Bowditch, he got up an instrument in which the finger was suspended in a movable frame, very much as a compass is supported. By this means he got some very complex motions, which represented the tremor of the arm, and which were published in his paper on the subject. The difficulty is that we are trying to register in one plane the movements occurring in two or three planes, and, on looking at it, it seems that when we read the motion from a pressure-tremor, which is all in one plane, the results may be misleading. Therefore, while the results are interesting they are not very positive. In the work above referred to, by Dr. Bullard, a great many clinical observations were made and were published; but, so far as I now recall them, no very positive results, as regards tremor, were obtained.

Dr. Eshner: I did not mean to imply that tremor is not distinctive of exophthalmic goitre, but I do maintain that there is nothing characteristic or distinguishing in the movement, at least in so far as can be demonstrated graphically. Tremor attends many states, but its character is in general not distinctive, as the great variation in frequency and range shows. I am familiar with the instrument of Bullard, and attempted to use it in the beginning of this study, but found it unsuited to the purposes of the work. The tracings secured with it were not unlike those recorded by Dr. Guy Hinsdale in a study of the movements of the head under varying conditions.

CASE OF FOREIGN BODY IN THE LARYNX; DEATH FROM SUFFOCATION.

By GUY HINSDALE, M.D.

[Read November 4, 1896.]

The specimen was removed from the body of a child, a boy aged four years and nine months. It was a case of sudden and unaccountable death, which had been reported to the coroner, and it is owing to the courtesy of the coroner's physician, Dr. H. W. Cattell, that I was asked to make the autopsy, and am able to present this specimen. We had no clue to the cause of death except a memorandum suggesting that it might be a case of heart-disease. We examined all the organs as well as the brain, and finally explored the throat and larynx, and on removing the latter we discovered a pencil two and a quarter inches (55 mm.) long firmly fixed in the larynx and extending downward into the trachea. The blunt point of the pencil is uppermost and is just visible above the vocal cords; the calibre of the wind-pipe is completely filled by the pencil, which has a diameter of 7 mm.

It appeared on further inquiry that the boy was playing near the doorway, and had been out of his mother's sight some ten or fifteen minutes when a passer-by noticed the child lying on the steps, carried him into the house apparently dead, but, as I am now told, they noticed that his heart was still beating; he was blue in the face and the hands were blue. The child was driven to the nearest hospital, where he was examined to see whether or not his neck were broken.

He probably died just after reaching the hospital. There had been no movements of the body and probably no respiratory sounds that directed attention to the throat, although the skin must have been deeply cyanosed. It was this feature of the case that gave color to the belief that the boy had died of heart-disease.

DISCUSSION.

Dr. A. A. Eshner: I happened to be present at the Polyclinic Hospital shortly after the child was brought in. The child, it was said, gasped once

or twice, and then fell back dead. As has been stated there was a good deal of uncertainty as to the cause of death. It was supposed that the child might have fallen and received an injury as the result of being forced off a step by other children. A fracture of the cervical vertebræ was suspected, and I was struck by the unusual mobility about the neck, but there was also a general lack of muscular rigidity. I could not detect crepitus, although one of the residents supposed that he had done so. It has been stated in the notes that at the post-mortem the child was deeply cyanosed about the head. When I saw the body it was intensely white. I asked the mother whether or not the child had at times become blue, and she replied in the affirmative. This testimony led to the belief that death might have been due to heart-disease.

A CASE OF MOVABLE LIVER.

By FREDERICK A. PACKARD, M.D.,
PHILADELPHIA.

[Read November 3, 1896.]

The case herewith reported was one which presented many points of interest during life, and this interest is rather intensified than lessened by the negative findings of the post-mortem examination. The fact that an error in diagnosis was made rather enhances the value of the report of such a case, and it is presented with a view to preventing similar mistakes in other instances, and calling attention anew to a subject that is deserving of careful consideration.

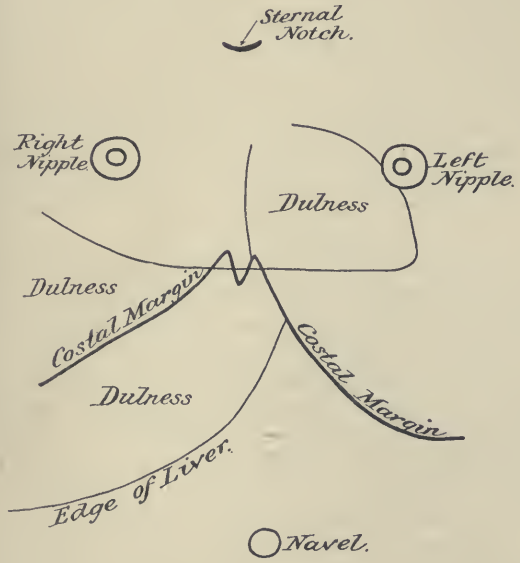
The history of the patient is as follows:

Matthew L., white, aged forty years, a native of Finland, and a laborer by occupation, was admitted to the Philadelphia Hospital on August 8, 1896. The family and personal history of the patient presents no point of interest save for the occurrence of two previous attacks of acute articular rheumatism, the absence of venereal history, and the moderate use of alcohol.

He was admitted for a third attack of acute articular rheumatism manifesting itself in the left ankle and the right elbow. On examination by my predecessor, Dr. T. G. Ashton, there were found, besides the ordinary signs of the local trouble in the joints named, a heaving cardiac impulse, a sharp and accentuated second aortic sound, and a soft apical systolic murmur. Under sodium salicylate the rheumatic manifestations promptly subsided. Before convalescence was fully established the temperature began to slowly and progressively rise. This rise proved to be the beginning of an attack of typhoid fever which was only remarkable for the exacerbation of an old chronic parenchymatous nephritis, which for two days was accompanied by almost complete suppression of urine. The temperature reached the normal point on September 8th, and showed no subsequent rise that could be attributed to typhoid fever.

On September 23d he first complained of pain in the abdomen. This was stated to be in the region of the liver, especially in the neighborhood of the position of the gall-bladder. It was paroxysmal, always worse in the evening, and was oftentimes sufficiently severe to cause him to groan loudly. On September 28th he was slightly jaundiced, the stools were clay-colored, and the urine contained a small quantity of albumin, numerous granular casts, and biliary-coloring matter.

Shortly after this date, October 1st, I took charge of the ward. He was still slightly jaundiced, he was somewhat thin, his expression was rather anxious, and he appeared to be a decidedly ill man. A severe attack of colicky pain during the preceding night suggested the possibility of gallstone passage. His temperature was $100\frac{2}{5}°$ F.; the pulse rather soft and rapid.



The abdomen was quite distended and there was decided tenderness at the extreme right of the epigastric region. The liver-dulness extended in the right nipple-line from the upper border of the sixth rib to a point nine to ten centimetres below the costal margin, where the edge could be distinctly felt running in the direction seen in the tracing here reproduced (of one-fourth the size of the original direct tracing taken on cheese-cloth placed over the chest and abdomen). There was no splenic enlargement and no ascites. The area of cardiac dulness was not markedly enlarged (doubtless owing to pulmonary overlapping), and at the apex there was a soft-blowing, poorly-transmitted systolic murmur. Anteriorly the lungs showed no abnormality aside

from decided emphysema. Posteriorly there was dulness from the right inferior scapular angle downward to the base. Over this area the breath-sounds were harsh, rather feeble and distant, and there was slight diminution in vocal resonance and tactile fremitus.

These physical signs persisted uninterruptedly save on two occasions, when, after five-grain doses of blue mass, the edge of the mass receded decidedly toward the costal margin, and the area of dulness on the right side of the abdomen became decidedly less prolonged downward. The edge felt on palpation, and the area of dulness held the same positions on every examination save on the two days that followed the administration of the evening dose of blue mass. The temperature of the morning was persistently subnormal, while that of the evening reached the neighborhood of 100° F. until October 5th, when it remained at subnormal during the whole twenty-four hours. During this time the slight jaundice steadily persisted, and the epigastric pain continued save on the days after the administration of blue mass. On October 8th I made an exploratory puncture in the eighth right intercostal space in the anterior axillary line. The needle of the aspirator was slowly introduced up to the socket and slowly withdrawn, but nothing was obtained save some thick, dark blood. The needle was moved strongly by each respiratory act, and both on its introduction and during its stay in the liver the patient complained of severe pain in the right shoulder.

On the next day the patient expressed himself as feeling much better, and there was slightly less distention of the abdomen. There was, however, no marked change in the abnormal mass within the abdomen.

On October 9th he was transferred to the surgical ward for operation for possible subdiaphragmatic abscess. While waiting for improvement in his general condition before the exploratory operation, the patient, on October 11th, fell out of bed and was picked up unconscious, with stertorous breathing, unequal pupils, divergent strabismus, and complete palsy of the left side. He died on October 15th.

The diagnosis suggested by the physical signs were enlargement of the liver from hypertrophic cirrhosis or amyloid change; enlargement from new growth, enlargement from abscess, displacement from intrathoracic disease, and displacement from subdiaphragmatic abscess. Hypertrophic cirrhosis was excluded by the supposedly recent development of the condition, somewhat aided by the absence of ascites, of splenic enlargement, of the characteristic hue of skin, and by the presence of acute paroxysmal pain, and by the acute onset of his slight degree of jaundice; amyloid disease was excluded by the absence of cause for that condition, by the absence of splenic involvement, by the freedom of the urine from the characteristic properties of the albuminuria of amyloid kidneys, and by the absence of the facies that is so usually present in cases of that lesion; enlargement from new growth was excluded by the normal characters of the palpable margin and

by the rapid development; displacement from intrathoracic disease was ruled out by the extent of the downward extension of liver-dulness in comparison with the extent of the emphysema and the amount of the pleural effusion. Two possibilities were supposed to remain—hepatic abscess and subdiaphragmatic abscess. In regard to the former, it is now undoubted that abscess of the liver is a rare, but by no means unheard-of, sequel of typhoid fever, as is shown by the fact that Lannois found it once in 71 cases of typhoid fever, Romberg found it at autopsy in one case out of 88 fatal cases in a series of 677, and Dopfer found abscess of the liver in 10 out of 927 cases that came to autopsy. In Lannois's case cocci were found with Eberth's bacillus, but that the typhoid bacillus is capable of itself of producing suppuration has been shown by Dmockowski and Janowski, Flexner, Tictine, Martin and Robertson, Michon, Zahradnicky, Swiezynsky, Stühlen, Bruni, Catrin, and many other observers. It is just possible that the occurrence of a case of abscess of the liver after typhoid fever in another patient in the hospital during the summer may have added to the apparent likelihood of the presence of this condition in our patient. Subdiaphragmatic abscess was seriously considered because of the accompanying pleural effusion (which might, of course, have been caused indirectly by an abscess of the liver), but chiefly by the negative result of the puncture.

The patient was seen in consultation by one of the surgeons on the staff of the hospital, who agreed in the view that exploratory puncture of the liver could alone exclude abscess, and that, in case of a negative result of such puncture, exploratory incision should be made with a view to emptying the possible subdiaphragmatic abscess. I might say that he also felt the edge of the mass as depicted in the outline, so that the existence of such an edge was perfectly apparent to others besides myself.

Fortunately for us, and possibly for the patient, his condition was not deemed sufficiently favorable for immediate operation, and it was decided to endeavor to improve his general state before using the knife. Unfortunately for the patient—luckily from a strictly medical point of view—a sudden cerebral hemorrhage caused death before his general condition warranted serious surgical interference.

The autopsy was performed by Dr. Jamison, one of the assistant pathologists to the hospital, whose notes I copy:

Body of an emaciated male. Rigor mortis present.

Appendix curled under cæcum. On outside of it is a well-organized band of adhesion, the result of an old inflammatory deposit.

Gall-bladder filled with fluid and adherent to great omentum.

Left *pleural* sac is normal except for a few adhesions posteriorly. The right pleural sac contained about a half-pint of fluid. No evidence of pleurisy; no adhesions.

Pericardium normal.

Weight of *heart*, 750 grammes. The right auricle contained only fluid-

blood, as did also the other cavities. The valves were normal. Both ventricles were dilated. The right ventricular wall was firm, rather pale, more than twice its normal thickness. The left ventricular wall enormously thickened, as are also the papillary muscles.

The left *lung* is extremely emphysematous and congested; weight, 610 grammes. The right lung also extremely emphysematous, with no areas of consolidation; weight, 730 grammes.

The *spleen* weighed 250 grammes; its surface was smooth; the organ abnormally hard on section, dark-red, fibrous tissue prominent.

Left *kidney* weighed 160 grammes. Organ firm, capsule adherent, cortex granular and reduced in thickness; bloodvessels thickened. Right kidney weighed 150 grammes. A small cyst present in cortex. Condition otherwise similar to left.

Ureters normal.

Bladder filled with urine; its wall thickened and distinctly ribbed.

Duodenum normal.

Stomach showed pronounced post-mortem staining. The mucous membrane was corrugated and covered with mucus.

Pancreas normal.

Liver weighed 1610 grammes. Surface smooth and shows recent aspirator puncture upon the upper surface, about three inches from the right end and two inches in front of the coronary ligament.

The large *arteries* are distinctly atheromatous.

Semilunar ganglia normal.

Thoracic duct normal.

The *intestines* showed Peyer's patches that had recently been the seat of typhoid ulcers. In one ulcer the cicatrization was scarcely complete. Otherwise the intestines were normal.

Calvarium and *dura mater* normal.

The surface of the *cerebellum* showed a collection of blood beneath the pia. On section the blood was found to extend down between the branches of the tree, and was also found in the fourth ventricle. The right hemisphere was very soft, and on opening the lateral ventricle it was found to contain a clot of blood, weighing about three ounces, and fragments of brain tissue. The entire floor of the ventricle was torn up by the hemorrhage. The left lateral ventricle also contained blood which had entered it from the other side. No lesion of the substance of the left hemisphere.

The clinical diagnosis sent to the pathologist was "probable subdiaphragmatic abscess following typhoid fever." Careful search revealed no grounds for such a diagnosis, and, unfortunately, in the course of the examination the attachments and relations of the liver were destroyed before the thought sug-

gested itself to me that I had had to do with a movable liver. My first suspicion that I had been led into error by such an anomaly was when I saw the point of puncture at the very top of the liver, and found that the track of the puncture led directly downward into the substance when the liver was held in the position normally maintained in the body. I then perceived that it would have been impossible for me to have produced the lesion having this position and direction unless the liver had during life occupied an abnormal position. (The liver at autopsy was found in its normal position, under the diaphragm, and almost hidden by the costal cartilages.)

The absence of investigation of measurements of the ligaments of the liver and of the relations of the vena cava and also as to the mobility of the liver, is a misfortune; but I think it fair to judge that the mobility of the liver was demonstrated by the track of the puncture just as in the experiments in locating internal organs on the cadaver by the insertion of long pins.

To strengthen the proof of this being the condition present during life, I should mention the jaundice that was present, presumably from kinking of the bile-ducts, and the over-distention of the gall-bladder produced in the same way. The improvement in signs and symptoms after the administration of laxatives coincides perfectly with the case of Szigethy (given by Faure in his Paris *Thesis* of 1892, p. 205, obs. xlix), where the movable liver was found to disappear from its abnormal position after the use of laxatives.

To my great comfort I have found in the literature several other cases of mistaken diagnoses from the same condition. Among these I might mention the case of Peters,[1] operated upon by laparotomy for supposed hydronephrosis; the case reported by Terrier and Baudouin,[2] wherein a supposed floating kidney proved to be a dislocated liver; that of Richelot,[3] where typhlitis was suspected, and where displaced liver was found

[1] Medical Gazette, 1882, p. 412.
[2] Progrès Médicale, 1888, pp. 121–123.
[3] Union Médicale, 1893, 3 S., lvi. pp. 169–172.

at operation; that of P. Müller,[1] where carcinoma of the mesentery was mistaken for a wandering liver; and the case of Legg,[2] where a supposed wandering liver proved to be a tumor of the kidney. I consider myself fortunate in having made a mistake which, through a mere coincidence, had no bad results.

The literature regarding movable liver is now quite extensive, the greater number of articles being contributed by gynecologists, and the larger proportion of the cases being associated with pendulous abdomens. A complete review of the literature would be useless in view of the admirable work in this line already performed by Faure in his Paris *Thesis* of 1892, and by J. E. Graham, in the *Transactions of the Association of American Physicians*, 1895, vol. x. p. 258. A few points may be here referred to because they have some bearing upon the case reported. Landau[3] says, on page 10: "In the cases in which death permitted the diagnosis to be controlled, this proved wrong, since the normal liver was found in its normal place." This remark applies equally to our case, yet the point and direction of the puncture seem to me to be conclusive evidence of the fact of hepatic mobility. George Harley,[4] on page 53, says: "There is yet another possible source of error, though, from its extreme rarity, an error is unlikely to be committed. But, as the mistake is said to have once occurred, and it is quite possible it may occur again, it is but right that I should call attention to it—namely, the possibility of mistaking an anteverted small liver for an enlarged one." He then relates the case of a man whose liver-dulness extended from two fingers' breadth below the nipple to the crest of the ileum, and partly into the iliac fossa, a distance of eight inches in the perpendicular nipple-line. At the autopsy the liver was found to measure ten by eight inches, to weigh fifty-six ounces, and to be so placed that its under surface lay in the lumbar region, the anterior edge of the right lobe in the iliac fossa, a condition

[1] Deutsches Archives für klinische Medicin, 1875, Bd. xiv. Heft 1.
[2] St. Bartholomew's Hospital Reports, 1877, xiii. p. 141.
[3] Die Wanderleber und der Hängebauch der Frauen, Berlin, 1885.
[4] A Treatise on Diseases of the Liver, London, 1883.

that would partly account for the signs in my case that were presented during life, and one that may readily be conceived to have changed during manipulation of the body after death.

Meissner[1] advanced the theory that there must be in certain individuals a mesohepar that determines the occurrence of wandering liver in some, but not in all women with pendulous abdomens. He points out what is frequently ignored by other writers, the fact that enlargement of the uterus in pregnancy would not cause sinking of the liver, but would rather press it up against the diaphragm; but that peritoneal adhesions between the different abdominal organs or directly between the uterus and the liver could readily produce great mobility of the latter. In the case that forms the basis of this article the condition of the suspensory and other ligaments of the liver was not studied at autopsy because of the erroneous clinical diagnosis.

Winkler[2] denies the necessity for the presence of the mesohepar of Meissner's view, and attributes the displacement to pendulous abdomen, and stretching of the suspensory ligament.

J. Wickham Legg[3] expresses a doubt as to the diagnosis of wandering liver, and states that in the two autopsies that had been held up to the time of his article, the liver was found in its natural place, and some other organ had been mistaken for the liver. In the case reported in his article, the supposed displaced liver was proven at autopsy to be a renal new growth. In my own case there was but one mass that could have given rise to the signs observed, and yet have disappeared after death—that is to say, a transverse colon containing feces. This explanation would at first sight seem to be strengthened by the disappearance of the mass on two occasions after laxatives. On the other hand, the evacuations produced by blue mass were not such as would have resulted from an emptying of an overloaded colon, and it is also inconceivable that a reaccu-

[1] Die wandern der Leber in ihren correlativen Beziehungen zu Schwangerschaft, Geburt und Wochenbett. Schmidt's Jahrbücher, 1869, p. 111.

[2] Zur Casuistik und Aetiologie der Wanderleber. Archiv für Gynäkologie, 1872, Bd. iv. p. 145.

[3] St. Bartholomew's Hospital Reports, 1877, xiii. p. 141.

mulation would on two occasions have taken place in twenty-four or even forty-eight hours after the laxative had acted.

Wassilief[1] refers to a case observed by Botkin, where at autopsy the suspensory and lateral ligaments were "plainly and considerably elongated." This observation is certainly exceptional, and is of interest in connection with Faure's experiments on the cadaver.

An autopsy upon a case is reported by Peters,[2] where the liver was found with its long diameter parallel to the median line of the body with the right lobe below. All of the abdominal viscera were displaced. The condition of the ligaments of the liver is not stated in the report.

Gontermann[3] reports a case of probable sudden dislocation of the liver during severe coughing in a child about a year old. Sudden death occurred seventeen days after the onset from supposed twisting of the pedicle. No autopsy was performed, the diagnosis being based upon the character of the abdominal mass and the absence of liver-dulness in the normal position.

Binnie[4] reports a case of this trouble where laparotomy was performed for exploratory purposes, and the suspensory ligament was found to be elongated. In this case the right lobe of the liver was found to be enlarged and to present on its surface a nodule resembling a carcinomatous growth. This case is, of course, not to be placed in the same category with simple "movable liver," inasmuch as here there was a cause for the displacement within the liver itself.

By far the most valuable contribution to our knowledge of movable liver is the Paris *Thesis* of Faure (1892). He denies that the elastic cushion formed by the rest of the abdominal viscera plays any but a small *rôle* in the retention of the liver under the diaphragm, a function that they were supposed to possess. This sustaining power of the small intestines was

[1] Wiener medicinische Blätter, 1880, No. 30, p. 785.
[2] The Medical Gazette (New York), September 2, 1882.
[3] Deutsche medicinische Wochenschrift, November 13, 1890, p. 1043.
[4] International Journal of Surgery, December, 1892, p. 332.

chiefly urged by the gynecologists, notably by Landau,[1] on account of the frequent association with pendulous abdomens and, consequently, poorly-supported intestines frequently seen in multipara. Faure holds that the true suspensory ligament of the liver is the coronary ligament, or rather the numerous cellular and vascular bands contained between its layers. The most important support of the liver is, according to his view, furnished by the inferior vena cava, and his experiments upon the cadaver seem to support his theory. He found that in the cadaver, suspended in the upright position, a weight of ten kilogrammes could be attached to the liver with a resulting sinking of only one or two centimetres. On attaching a weight of twenty-five to forty kilogrammes, the various ligaments ruptured, the vena cava being the last to tear. When all of the ligaments and the vena cava inferior were left intact, they could support an additional weight of from thirty-five to forty kilogrammes; after section of the vena cava the ligaments could support twenty kilogrammes; while after section of the ligaments the vena cava could support twenty-seven to twenty-eight kilogrammes.

Faure concludes that elongation of the suspensory apparatus may be due to their stretching from the additional weight imposed upon them when the lesser means of support by the intestinal mass is lost through relaxation of the abdominal walls. As, however, many women have pendulous abdomens without movable liver, he concludes that there must be some other special predisposing cause for displacement. This he attributes to a badly-defined nutritive condition, which is shown by a tendency of the fibrous tissue to readily undergo distention or elongation. "It is this predisposition which in man causes hernias, in women linea albicantes and eventration, in both varices, movable kidney, enteroptosis, and falling of the liver."

Graham[2] has written an excellent article dealing chiefly with the symptomatology and etiology of the condition. He has

[1] Die Wanderleber und der Hängebauch, 1885.

[2] Transactions of the Association of American Physicians, 1895, vol. x. p. 258.

collected and tabulated sixty-nine cases from the literature, including three cases observed by himself.

To sum up the points of interest in the case herewith reported: the man had recovered from a fairly severe attack of a wasting fever, which may have been a factor in the production of the condition ultimately found to be present. During life there was found a much-depressed lower edge of the liver, temporarily displaced after cathartics, supposed to be due to hepatic abscess or subdiaphragmatic abscess. After death from a purely coincidental cause the liver was found to be not enlarged, and was in its normal position. Before any examination of the suspensory apparatus of the liver was made the liver was removed from the body, but the position and direction of the track of puncture, made during life by the aspirating needle, were such as to show that the liver must have occupied an unusual position at the time of puncture. Downward and forward dislocation, and a somewhat more marked sinking of the right than of the left extremity of the organ would alone explain the palpable edge in its ante-mortem position and the site and direction of puncture.

It is hoped that the publication of this case of mistaken diagnosis may possibly prevent some similar error, the consequences of which might be more serious than they luckily happened to be in our patient.

DISCUSSION.

Dr. W. W. Keen: I would like to say a word in reference to the paper, especially because only a week ago I was led into a similar mistake in diagnosis as Dr. Packard has referred to, in a case of floating liver. I have seen three cases of the kind. One is reported with a photograph in the *American Text-book of Surgery*. The diagnosis was verified at the post-mortem by Dr. Formad, who was then coroner's physician. I was not present at the post-mortem; but I learned from him that the liver was movable in all directions. The patient had died suddenly, I do not know from what cause, except that it was not connected with the liver. The next case was that of a child three years old, of which, unfortunately, I have no notes.

The last case I operated on a week ago in the Jefferson Hospital Clinic, and is reported below.

Dr. James Tyson: Was there any increased resonance on percussion in the region of the kidney?

Dr. Keen: I thought so; especially when the patient was on her left side, I believed that there was an undue amount of tympany on the right side, though this must have been a mistake. In a case which I recently saw with Dr. Steinbach, which was thought to be one of gallstones, it turned out to be a renal calculus. In another case, which I saw with Dr. Mears, the supposed renal calculus was found to be a gall-bladder full of gallstones. The two cases illustrate mistakes in opposite directions. I would like to ask Dr. Tyson if he believes the renal area can be certainly recognized by percussion?

Dr. Tyson: I quite agree with Dr. Keen, that the normal renal area is difficult to determine, and in many cases cannot be determined absolutely.

CHOLECYSTOTOMY: A FLOATING LIVER AND DISTENDED GALL-BLADDER MISTAKEN FOR A FLOATING KIDNEY.[1]

By W. W. KEEN, M.D.

Mrs. S., Salem County, N. J. (sent by Dr. Charles Newton, Sharpstown, N. J.), aged forty-four years, was admitted to the Jefferson Hospital October 19, 1896. Her mother died at sixty-seven, her father at seventy-five, from heart-trouble. She had the usual diseases of childhood. Since then her health has been unusually good; menstruation did not begin, however, until she was eighteen, was very painful, irregular, and profuse. Since her marriage it has ceased to be painful, and has become regular. She was married at twenty-one, and has had six children, the last eight years ago; two years ago she had a miscarriage.

Her present trouble began four years ago with pain in her right hypochondriac and umbilical regions, and has increased in the last year to severe paroxysmal pains. The bowels are regular. She has never had jaundice, nor any pain which would suggest the passage of a gallstone. She has dyspepsia and a slight cough. She has never passed blood by the urine or had any other special urinary symptoms.

Physical examination showed a relaxed abdominal wall. A movable tumor is found in the right lumbar region anteriorly, having the shape of the kidney. The long diameter of the tumor is nearly parallel with the border of the ribs on the right side and about at a right angle to the long axis of a distended gall-bladder in its ordinary position.

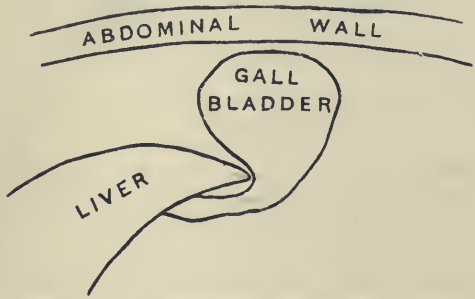
The tumor is somewhat larger than the normal kidney. A depression corresponding to the hilum is obscurely felt; no renal artery, however, can be observed. Upon deep palpation it is slightly painful. By bimanual examination it is felt reciprocally both in front and behind. There is diminished dulness in the right renal region. When she lies over on the left side or sits up, these various motions cause the tumor to move by gravity into every region of the abdomen except the left hypochondrium. Urine, October 20th, thirty ounces, acid; specific gravity, 1018; no albumin, no sugar; urea, 1.6 per cent.; total amount, 216 grains. The diagnosis that I made was of

[1] Read in the discussion on Dr. Frederick A. Packard's paper on "Movable Liver, with the Report of a Case."

floating kidney, and as it seemed to be enlarged and might require nephrectomy, it was very important that the amount of urea should be sufficiently great. Accordingly, I put her on a diet of animal broths, beef-tea, etc., and gave Poland water *ad libitum* with two ounces of whiskey in the twenty-four hours. In five days this increased the total amount of urine to sixty-four ounces, and though the specific gravity fell to 1011 and the urea to 0.9 per cent., the total amount of urea excreted rose to 256 grains.

Operation, October 28, 1896. I debated very much whether I should attack the tumor from the loin or from the abdomen. Its size was such that it seemed to me the incision in the loin would not allow of a thorough examination of the tumor to determine the nature of the disease, if any, nor whether it was the sole kidney present, should nephrectomy be necessary, even though I tore through the mesocolon, as suggested by Kocher, and carried my hand to the other side. I, therefore, determined finally to attack it by Langenbuch's incision at the outer border of the right rectus. If it were a kidney sufficiently normal simply to require sewing fast, I would then pass two sutures through the kidney and carry the two ends of each suture outward through the loin by a Baker-Brown needle (with the eye in the point), incising the skin of the loin so as to tie the thread subcutaneously, and then close the skin over it.

FIG. 1.



Showing the relation of the gall-bladder to the liver and the abdominal wall.

As soon as I opened the abdomen the liver came into view, and in a moment I was convinced that I had not to deal with a floating kidney, but a dilated gall-bladder and a floating liver. When the liver was in its normal position the gall-bladder lay parallel to its anterior border, but being distended had slipped, so to speak, from under cover of this anterior border and lay in a plane quite anterior to the border of the liver. (Fig. 1.) This accounted for my not having discovered the liver when palpating the tumor through the abdominal wall. Had I placed the patient on her left side and then percussed over the hypogastric region, the absence of the normal hepatic dulness would have suggested displacement of the liver.

The tumor was incurvated inferiorly, which explains the apparent hilum. Some stones were easily detected in the gall-bladder just at the entrance of the cystic duct. The gall-bladder was then opened and two faceted stones removed, each about 1.5 cm. in length; then I removed a very large cylindrical stone 3 cm. long and 2.5 cm. wide; beyond it in the cystic duct a fourth of the size of the first two, and further down in the cystic duct a fifth. (Fig. 2.) I was not able to extract this last stone, either by forceps or the finger introduced into the gall-bladder, either alone or by coaxing the stone along with the thumb and forefinger of the other hand on the outside of the cystic duct, the reason being that it lay around a sharp angular turn in the axis of

FIG. 2.

The two faceted stones are to the left; the furthest one in the cystic duct is the right lower one.

the duct. I, therefore, was obliged to make an opening in the duct and extract it. I then closed the opening in the duct by two rows of Lembert sutures, but the walls of the gall-bladder and of the duct being quite three millimetres in thickness and very rigid were very difficult to invert accurately. Fearful, therefore, of leakage, I inserted a glass drainage-tube down to this incision, and packed some iodoform-gauze around it. The opening in the gall-bladder was then stitched to the abdominal wall. This, I hoped, would anchor the liver in place.

Her temperature after the operation rose to 100.8° on the second day, then gradually declined, reaching the normal on the sixth day. The gauze and drainage-tube were removed on the third day. A moderate amount of bile flowed out of the opening in the gall-bladder for a few days, but the amount soon diminished, and the fistula was entirely closed by November 12th. She left the hospital a week later.

The anchorage of the liver seems excellent. When she sits up or lies on the left side the liver remains in its normal position, and she is entirely free from her former pains.

A CASE OF TRANSPOSITION OF THE VISCERA, ASSOCIATED WITH SMALL ROUND AND SPINDLE-CELLED SARCOMA OF THE LIVER AND PROBABLE SARCOMATOUS INFILTRATION OF OTHER ORGANS.

By H. M. FISHER, M.D.

[Read December 2, 1896.]

William G., aged forty-four years, married, born in Germany, a gardener by occupation, was admitted to my ward at the Episcopal Hospital, November 14, 1896.

Patient's father died at the age of fifty-four, of cancer of the stomach; his mother at the age of forty-five, of cardiac dropsy. Three brothers and one sister are alive and well. With the exception of an attack of malarial fever, ten years ago, he had been free from diseases of any kind until four years ago, when, after a blow or fall on the abdomen, he began to experience pain in the epigastric region. Soon after he first began to experience pain he became conscious of a distinct swelling in this region. The pain, at no time very severe, has been chiefly noticed when the abdominal muscles were strongly contracted or when pressure was made upon the epigastrium. The swelling has steadily, though slowly, increased.

Patient is a man of about average size, with well-developed muscles and is not at all emaciated, and does not present a cachectic appearance. There is a slight bulging of the epigastric region and of the lower half of the right thorax. Expansion of both lungs is equal and moderate. In the epigastric and both hypochondriac regions a tumor is felt extending as far as the umbilicus. The tumor moves with the acts of inspiration and expiration.

Percussion of the *left* chest in front shows normal pulmonary resonance as far as the fourth rib in the mammary line, where a slight veiling of the note is observed. Below the fifth rib there is absolute dulness, extending to the costal margin. In the median line dulness begins at the third costo-sternal junction and extneds to a point one and a half inches below the

xiphoid cartilage. In the *left axillary* line there is dulness from the fifth interspace to the lower costal margin. Over the left thorax posteriorly dulness begins at the ninth rib and extends to the costal margin.

Right chest. Dulness one inch to the right of the border of the sternum begins at the third interspace and extends downward below the margin of the ribs. When patient is in the sitting posture the dulness extends in this region to very near the limit over which the tumor can be felt, but when he lies down a narrow area of tympanitic resonance, probably from the underlying stomach, is developed just beneath the costal margin.

In the *right mammary* line dulness begins just above the fourth rib.

In the *right anterior* axillary line dulness is absolute from the fifth interspace downward.

Over the right side of the back dulness on percussion is absolute from the ninth rib downward.

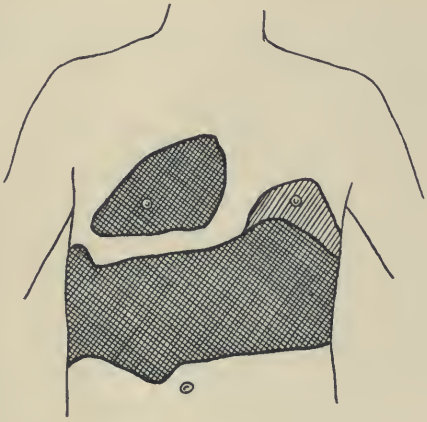
Palpation reveals the apex-beat of the *heart* 2.5 cm. to the right of the right nipple in the fifth interspace. Dulness in the second interspace does not extend beyond the left border of the clavicle, but at this point the heart-sounds are heard close to the ear, as in normal conditions, over the aortic valve. A triangular area of præcordial dulness can be distinctly mapped out by percussion to the right of the median line, conforming very closely in form to the normal left-sided præcordial dull area.

The heart, however, appears to be pushed somewhat outward by the abdominal growth. Chest-expansion normal. Breath-sounds are absolutely normal over the chest, both anteriorly and posteriorly. Vocal fremitus is not diminished, except at the lower fourth of the thorax, where the solid growth appears to encroach somewhat upon the thoracic cavity. No adventitious sounds are heard. The heart-sounds are perfectly normal.

Remarks. It has been found impossible to determine absolutely by percussion the transposition of all the viscera in this case. The difficulty in determining this consists in the fact of the presence of a large, probably subdiaphragmatic growth, which, not only over the normal hepatic region, but over the lower portion of the right thoracic cavity, gives rise to a wide area of percussion-dulness. Having previously determined, however, the transposition of the heart by percussion and auscultation, I asked my resident, Dr. Arthur W. Booth, to have the patient submitted to a radiographic investigation by Professor Goodspeed at the University of Pennsylvania.

The radiographs I herewith show the College exhibit fairly well the outlines of the tumor in the abdomen, and show that

it extends from a point near the umbilicus into both hypochondria. The position of the heart to the right of the median line is also clearly traced in one of the pictures. The subcostal portions of the tumor are, unfortunately, not seen in the radiographs.



The fluoroscope, however, showed clearly that the tumor was connected with the liver, and that this organ was situated chiefly on the left side of the body. It also showed an area of deep shade upon the right side in the lower axillary region, corresponding in shape and size to a normal spleen. The large area of dulness over the lower right thoracic area is probably, therefore, due to subpleural or subdiaphragmatic infiltration.

I have not had an opportunity of studying the whole literature of the subject, but there are, I think, fifty or sixty references to cases of transpositions of the viscera in the *Index Catalogue* of the Army Medical Library, and the last few annual issues of the *Index Medicus* contain perhaps a yearly average of about six such cases.

It is, therefore, not a case of extreme rarity, though I have seen only one other such case myself—in Professor Schroetter's wards in the hospital in Vienna. It was one of his pet cases, with which he delighted to puzzle the young doctors who took his course.

It is said that patients suffering from transposition of the viscera are especially liable to tuberculosis.

This man is, I think, suffering from a sarcomatous infiltration of the liver, and, possibly, of other organs.

[NOTE.—After this case was presented to the College I asked Dr. Richard Harte to make an exploratory incision and get a small section of the tumor, in order that the exact nature of the tumor might be determined.

I did this because I intended, if the tumor proved to be sarcomatous, to consult Dr. William B. Coley, of New York, on the expediency of submitting the patient to the treatment by the mixed toxins.[1] Dr. Harte accordingly made an incision in the median line of the abdomen, and a small section of the growth was removed.

Under the microscope this was found to consist of liver-substance infiltrated with accumulations of small round and spindle-cells, which evidently owed their origin to proliferation from the connective-tissue cells of the small new vessels. These vessels were seen imbedded in various parts of these cell-accumulations.

DISCUSSION.

DR. JAMES TYSON: Without having any very definite knowledge upon the subject, as far as the number of cases is concerned, of transposition of the viscera, it seems to me that this condition is not nearly so uncommon as is generally supposed. We have had a case in the wards of the Presbyterian Hospital this year, and I thought at first that this might be the same case; but it is not, so that this makes the second case that I have seen this year. I may say that nearly every year a case or two of transposition of the viscera come to my notice, and it is well-known that they turn up in the dissecting-room every now and then.

[1] American Journal of the Medical Sciences, September, 1896.

APPENDIX.

ADDITIONS TO THE MÜTTER MUSEUM.

SPECIMENS.

Larynx and Trachea with Foreign Body. Presented by Dr. H. W. Cattell.

Urethral Calculus. Presented by Dr. T. S. Westcott.

Dr. J. Marion Sims's Knives for Dividing the Cervix Uteri. Presented by Dr. J. V. Ingham.

Cupping Apparatus and Scarificator Pocket Case, formerly belonging to Dr. Edward Jenner Coxe. Presented by Miss Mary Clapier Coxe.

Fracture of the Cervical Spine. Presented by Dr. C. W. Dulles.

Fœtus. Presented by Dr. C. W. Dulles.

Gallstone. Presented by Dr. J. Hardcastle.

Twelve Experimental Fractures of the Lower End of the Radius. Presented by Dr. J. B. Roberts.

Microscope and Objectives. Presented by Dr. Roberts.

A Collection of Surgical Instruments formerly belonging to Dr. Owen Wister. Presented by Mr. Owen Wister.

Rupture of the Liver. Presented by Dr. W. J. Taylor.

Photographs of Filaria Sanguinis Hominis. Presented by Dr. F. P. Henry.

Hyperostosis Cranii. Presented by Dr. C. E. Hirwirsch.

Four Casts of a Case of Aneurism of the Aorta. Presented by Dr. John B. Shober.

A Collection of Fifty-two Gynecological Instruments and Ninety-two Pessaries. Presented by Dr. W. C. Goodell.

Dermoid Cyst. Presented by Dr. W. C. Goodell.

Fœtus from an Unruptured Tubal Pregnancy. Presented by Dr. W. C. Goodell.

Thickened Endometrium from a Case of Dysmenorrhœa. Presented by Dr. Goodell.

Spleen from a Case of Ruptured Tubal Pregnancy. Presented by Dr. Goodell.

Osteoma of Femur. Presented by Dr. J. E. Mears.

Fracture of the Hip-joint; impacted. Presented by Dr. O. H. Allis.

Antiquated Spectacles. Presented by Dr. C. A. Oliver.

Uterine Fibroid; fœtus *in situ*. Presented by Dr. Joseph Price.

ABSTRACT OF THE REPORT OF THE LIBRARY COMMITTEE.

THERE are now in the Library 51,985 volumes, exclusive of duplicates; an increase of 2238 over the number reported last year; and 31,000 unbound pamphlets, reports, and transactions.

There are still on hand 1921 duplicates, 1858 less than at date of last report; an unusually large number having been disposed of by sale or exchange during the year.

More than 600 current medical periodicals have been received during the year. Including these and purchases made for the completion of files, nearly 36,000 numbers of medical journals have been placed in the Library. As it has been found that the demand for journals is about four times as great as that for all other books, special efforts are being made to develop this branch of the Library.

Twenty of the new publications presented were written or edited by Fellows of the College.

There have been 5184 visitors to the Library; an increase of 670 over the preceding year.

Two thousand one hundred and eighty-five books have been taken out; an increase of 199; and 12,144 books have been furnished for consultation by the Assistant Librarian, besides a large number taken from the shelves by Fellows of the College who have access to the cases; an increase of 3329.

GEORGE C. HARLAN,
Chairman.

LIST OF PAPERS: SECTION ON OPHTHALMOLOGY.

January 18, 1896.

Case of Partial Rupture of Eyeball, by Dr. George Friebis.

Restoration of the Upper Lid Border by Hotz's Method, by G. E. de Schweinitz.

Glioma of the Retina, by Dr. Howard F. Hansell.

An Operation for the Enlargement of the Orbit, by Dr. George C. Harlan.

Removal of Steel from the Vitreous by the Hirschberg Magnet, by Dr. C. A. Oliver.

Removal of Steel from the Vitreous by the Hirschberg Magnet, by Dr. S. Lewis Zeigler.

Laceration of the Eyeball, by Dr. G. E. de Schweinitz.

Three Cases of Macular Hemorrhage, by Dr. G. E. de Schweinitz.

Sketch of Macular Hemorrhage, by Dr. C. A. Oliver.

Macular Hemorrhage in a Child, by Dr. G. C. Harlan.

February 18, 1896.

Disabilities Due to Eye-strain, by Dr. S. Weir Mitchell.

Irregular Spasmodic Strabismus, by Dr. C. H. Thomas.

A New Light Screen, by Dr. M. W. Zimmerman.

March 17, 1896.

Traumatic Enophthalmus, by Dr. G. C. Harlan.

Monocular Retinal Detachment, by Dr. F. M. Perkins.

Ciliary Staphyloma with Excavation of the Optic Disk, by Dr. C. A. Oliver.

Unusual Form of Macular Lesion following Iritis, by Dr. G. E. de Schweinitz.

Sketch of Sub-macular Hemorrhage, by Dr. C. A. Oliver.

Convergent Squint with Myopia, by Dr. G. E. de Schweinitz.

An Asbestos Cover Chimney, by Dr. James Thorington.

A New Form of Perimetric Lenses, by Dr. James Thorington.

Microscopic Sections of Comparative Anatomy, by Dr. C. A. Oliver.

April 21, 1896.

A Modified Form of Pressure and Protection Bandage, by Dr. P. N. K. Schwenk.

Bitemporal Hemianopsia in Locomotor Ataxia, by Dr. G. C. Harlan.
Unilateral Acute Optic Neuritis, by Dr. G. Oram Ring.
Hotz Operation for Entropion, by Dr. G. Oram Ring.
Acute Double Atrophy of the Optic Nerves from Ethmoiditis, by Dr. Howard F. Hansell.
Complications following Cataract Extraction, Dr. C. A. Oliver.
Congenital Aniridia, by Dr. W. F. Norris.
An Instrument for Retinoscopy, by Dr. F. M. Perkins.
A Simple Contrivance for Retinoscopy, by Dr. B. A. Randall.
An Instrument for Retinoscopy, Dr. Francis Rudderow.
Traumatic Enophthalmus, by Dr. John B. Roberts.
Traumatic Enophthalmus, by Dr. C. A. Oliver.

October 20, 1896.

Unilateral Optic Neuritis, by Dr. John T. Carpenter, Jr.
Probable Intraocular Growth in its Early Stages, by Dr. C. A. Oliver.
Two Practical Points about the Corneal Reflex, by Dr. Edward Jackson.
Rhinitis as a Factor in Phlyctenular Ophthalmia, by Dr. B. A. Randall.
Defective Coquilles, by Dr. S. D. Risley.

November 17, 1896.

Unilateral Albuminuric Retinitis, by Dr. G. E. de Schweinitz.
Removal of Steel from the Vitreous by the Hirschberg Magnet, by Dr. G. Oram Ring.
A Case of Foreign Body in the Vitreous, by Dr. W. M. Zimmerman.
Removal of Steel from the Vitreous by the Hirschberg Magnet, by Dr. H. F. Hansell.
Study of a Case of Epithelioma of the Cornea-scleral Junction, by Dr. C. A. Oliver.
Ophthalmoscopic Sketches of Chorio-retinal Changes, by Dr. C. A. Oliver.
A Case of Deficiency of Pigment of the Iris, by Dr. Edward Jackson.
December meeting omitted.

HOWARD F. HANSEL,
Clerk of Section.

LIST OF PAPERS: SECTION ON OTOLOGY AND LARYNGOLOGY.

During the past year eight meetings of the Section have been held, viz., in January, February, March, April, May, October, November, and December. Fourteen scientific papers, eight cases and three specimens were presented.

A Case of Irruption of a Bicuspid Tooth into the Nasal Chamber (removal), by Dr. Alexander Wat MacCoy.

A Case of Hemorrhagic Laryngitis following Measles in an Adult, by Dr. Frank Woodbury.

An Unusual Case of Papilloma of the Larynx, with Exhibition of Instruments, by Dr. Joseph S. Gibbs.

A Naso-pharyngeal growth, by Dr. Joseph S. Gibbs.

A Case of Mucocele, by Dr. Arthur W. Watson.

Minute Structure of Adenoid Hypertrophy of the Naso-pharynx, by Dr. Harrison Allen.

Some Notes on a Case of Suppurative Mastoiditis of both Mastoids, Complicating Measles, by Dr. A. A. Bliss.

A Preliminary Contribution to the Study of Eustachian Congestion and Hyperplasia, by Dr. A. W. MacCoy.

Exhibition of a Case of Suppuration Healed after Exfoliation of the Stapes, by Dr. B. A. Randall.

Synopsis of Twenty-six Cases of Chronic Tympanic Vertigo and Tinnitus relieved by Intra-tympanic Operation, by Dr. C. H. Burnett.

A New Operation for Deflection of the Nasal Septum, by Dr. E. B. Gleason.

A Case of Carcinoma of the Antrum, with Notes of Operation, by Drs. E. L. Vansant and M. B. Miller.

A Preliminary Note on Certain Pathologic Conditions of Rosenmüller's Fossæ and Eustachian Tubes, by Dr. A. W. MacCoy.

Treatment of Aural Eczema, by Dr. B. A. Randall.

Cases Exhibited at the Meetings.

A Case of Cyst of the Epiglottis, by Dr. E. L. Vansant.

A Case of Objective Tinnitus, by Dr. B. A. Randall.

A Reported Case of Complicated Mastoid Operation, by Dr. B. A. Randall.

A Reported Case of Naso-pharyngeal Growth, by Dr. W. R. Hoch.

A Case of Naso-pharyngeal growth, by Dr. E. B. Gleason.

A Case of Naso-pharyngeal growth, by Dr. A. W. Watson.

A Reported Case where the X-Rays were used to Ascertain the Limits of a Tumor Pressing on the Trachea and Larynx, by Dr. E. L. Vansant.

A Reported Case of Transference of an Eczematous Inflammation from the Skin to the Nasal Mucous Membrane, by Dr. A. W. Watson.

Specimens Exhibited at the Meetings.

Specimen from a Case of Naso-pharyngeal Growth, by Dr. W. R. Hoch.

Cystic Polyp from the Pharynx, by Dr. E. B. Gleason.

Unclassified Membranous Material from the Tonsils, by Dr. H. Allen.

Attendance: Total number of Fellows, 58; total number of guests, 39.

EUGENE LARUE VANSANT,
Clerk of Section.

LIST OF PAPERS: SECTION ON GYNECOLOGY.

January 16, 1896.

Recent Bacteriological Investigations Concerning the Nature of Puerperal Fever, by Dr. William T. Lusk, of New York (by invitation).

February 20, 1896.

A Secondary Operation for Tubercular Peritonitis, by Dr. B. H. Hamill.

A New Operation for Uterine Prolapse, by Dr. J. M. Baldy.

Inversion of the Uterus, by Dr. B. C. Hirst.

A Case of Pelvic Cellulitis of Puerperal Origin Unconnected with Disease of the Fallopian Tubes, by Dr. C. B. Penrose.

March 19, 1896.

Report of a Case of Hysterectomy for Acute Puerperal Sepsis, with Recovery, by Dr. C B. Penrose.

A Case of Puerperal Thrombosis and Phlebitis, by Dr. J. M. Baldy.

A Case of Hysterectomy for a Remarkable Condition, by Dr. George E. Shoemaker.

April 16, 1896.

Bacteriology of the Vagina. Two Cases of Tetanus after Labor. Puerperal Convulsion from Intestinal Toxæmia. A Large Hæmatoma of the Vulva, by Dr. B. C. Hirst.

Cases Illustrating the Value of Conservatism in Surgery, by Dr. C. B. Penrose.

May 21, 1896.

A Case of Cæsarean Section and Hysterectomy for Myofibroma Complicating Pregnancy; Recovery, by Dr. B H. Hamill.

The Bicycle for Women, by Dr. James F. Prendergast (by invitation).

Three Cases of Tubercular Peritonitis, by Dr. R. C. Norris.

Modern Methods in the Treatment of Puerperal Infection and their Worth, by Dr. B. C. Hirst.

October 15, 1896.

Prolonged Labor, by Dr. Sprenkle (by invitation).

Hysterectomy by Combined Operation Through Abdomen and Vagina, by Dr. C. B. Penrose.

November 19, 1896.

An Enormous Fibroid Tumor of the Uterus. Spontaneous Rupture of an Oöphoritic Cyst, by Dr. C. B. Penrose.

Two Labors following Suspensio-uteri, by Dr. R. C. Norris.

Two Deliveries Succeeding the Operation of Suspensio-uteri. Congenital Absence of Uterus, Tubes, and Ovaries. Technique in Cæsarean Section, by Dr. B. C. Hirst.

December 17, 1896.

Notes on Diagnosis and Treatment of Diseases of the Female Urinary Organs, by Dr. Alexander J. C. Skene (by invitation).

JOHN B. SHOBER,
Clerk of Section.

LIST OF PAPERS: SECTION ON GENERAL SURGERY.

December, 1895.

Dr. Thomas F. Branson reported, by invitation, A Case of Fracture of the Coronoid Process of the Ulna.

Dr. Edward Martin made some remarks on Fractures of the Leg Treated by the Ambulant Method.

Dr. L. McLane Tiffany, Professor of Surgery in the University of Maryland, by invitation, read a paper on The Treatment of Compound Fractures of the Lower Extremity.

Dr. L. S. Pilcher, Surgeon to the M. E. Hospital of Brooklyn, by invitation, gave the results of personal experience in The Ambulant Treatment of Fractures.

January, 1896.

Dr. D. T. Lainé reported Cases of Appendicitis Illustrating Some of the Difficulties in Diagnosis Occasionally Met with, and Certain Points in the Pathology of the Disease.

Dr. John B. Roberts reported A Case of Congenital Absence of the Vermiform Appendix; also A Case of Simultaneous Operation for Appendicitis and Mastoiditis.

Dr. Alfred Stengel made some remarks on The Pathology of Appendicitis.

The Discussion on the subject of Appendicitis was opened by Dr. J. H. Musser.

February, 1896.

Dr. Thomas S. K. Morton showed the result in A Case of Extensive Machinery-wound of the Arm, Dividing the Brachial Artery and the Ulna Nerve; Ligation of the Artery and Suture of the Nerve; Recovery, with Regeneration of the Nerve and Restoration of the Arm-functions; and exhibited A Case Demonstrating the Ultimate Effects of Transperitoneal Ligation of the External Iliac Artery for Ilio-femoral Aneurism.

Dr. J. William White read a paper entitled Should the Vermiform Appendix be Removed in Every Case of Appendiceal Abscess? The discussion was opened by Dr. Charles McBurney, Professor of Surgery in the College of Physicians and Surgeons, New York.

Dr. Thomas S. K. Morton reported A Case of Fracture-dislocation at the Shoulder, in which the Humeral Head was Replaced by McBurney's Incision and Hook-traction Method.

March, 1896.

Dr. George Henry Fox, of New York, by invitation, delivered an address on The Diagnostic Features of Cutaneous Syphilis, which was illustrated by one hundred and fifty lantern slides.

April, 1896.

Dr. Edward Martin exhibited A Case of Lymphadenoma Testis; A Case of Cured Hypospadia; A Case of Castration for Prostatic Hypertrophy; and A Case of Liver Abscess Several Years After Operation; and also An Apparatus for the Sterilization of Soft Urethral Instruments.

Dr. John B. Roberts showed the result in Two Cases of Fracture of the Patella, One Treated by Malgaigne's Hooks and the Other by Horizontal Purse-string Suture.

Dr. W. H. Noble exhibited A Case of Excision of the Superior Maxilla; Two Cases Showing the Result of Operation for Saddle-back Nose; and A Case of Excision of the Left Cornua of the Hyoid Bone; also Trays for the Sterilization and Transportation of Instruments and Dressings.

Dr. Thomas S. K. Morton read a paper on Early Operative Interference in Acute Osteomyelitis.

May, 1896.

Dr. A. B. Hirsh reported the case of a patient, seventy-eight years of age, operated upon six years ago for an ovarian cyst. At that time a mammary scirrhus was apparently undergoing atrophy; it has recently begun to proliferate.

Dr. Thomas S. K. Morton presented an infant, nine months old, operated upon for A Large Angioma by a New, Practically Bloodless, Method of Excision; a Fibula Removed for Necrosis Incident to Bright's Disease; a Case of Appendicitis Obliterans, and A Large Papillomatous Ovarian Cyst.

Dr. Edward Martin exhibited a Case Showing the Result for Deformed Nose; a Case of Secondary Suture of the Median Nerve; and Two Cases of United Fracture by Metal Plates.

Dr. J. William White and Dr. C. L. Leonard exhibited Lantern Slides prepared by Professor Goodspeed, of the University of Pennsylvania, illustrating The Practical Application of the Roentgen Rays to Surgery. The patients (from Dr. White's service at the University Hospital) were also shown. 1. Ununited fracture of both bones of the forearm, showing wire sutures in position. 2. Ununited fracture of both bones of the forearm, showing union between the proximal end of the ulna and the distal end of the radius. 3. Ankylosis of elbow after fracture of the humerus and dislocation of both bones of the forearm backward. 4. Partial ankylosis at the elbow-joint after old fracture, with partial loss of flexion and extension and pronation and supination. 5. Excision of the head of the radius for forward luxation. 6. Curvature of the radius due to arrested develop-

ment of the ulna at its distal epiphysis. 7. Diastasis of the distal epiphysis of the humerus resulting from a fall upon the hand. 8. Diastasis of the proximal epiphysis of the humerus, with overlapping of the fragments and union in faulty position. 9. The result obtained in excision of the knee. 10. Foreign body in the arm. 11. Bullet in forearm. Exhibition of slides showing various portions of the normal skeleton by Professor Goodspeed.

Dr. Thomas G. Morton exhibited Skiagraphs Showing the Conditions Present in Metatarsalgia.

Dr. Orville Horwitz reported A Case of Complete Extirpation of the Penis, and will exhibit the patient.

October, 1896.

Dr. Randolph Faries described A Modified Form of Antero-posterior Brace for the Treatment of Pott's Disease.

Dr. Joseph M. Spellissey reported A Death during the Administration of Ether.

Dr. John B. Roberts reported A Successful Operation for Cleft of the Hard and Soft Palate, and exhibited the patient.

Dr. J. William White and Dr. Alfred C. Wood read a paper on Some Recent Cases of Renal Surgery.

November, 1896.

Dr. W. H. Noble reported Two Cases Operated Upon for Unique Conditions of the Appendix; A Case in which Nephrectomy was Performed, with exhibition of the patient and the specimen, and showed Sixteen Vesical Calculi Removed from One Case.

Dr. Joseph P. Tunis described A Unique Plastic Operation on the Nose, and exhibited the patient.

Dr. John B. Shober made a report on A Skiagraph of the Deformity following a Colles Fracture of the Radius.

Dr. W. Barton Hopkins reported A Case of Congenital Absence of Both Patellæ, which was supplemented by a *résumé* of the literature of the subject, and exhibited a Large Tumor Removed from the Tongue.

ALFRED C. WOODS,
Clerk of Section.

INDEX.

Abscess of brain, 159
Accidental restoration of dislocated shoulder and hip, 188
Allis, Oscar H., 90, 96, 188, 195
Appendix, 249
Ashhurst, John, Jr., 95
Aural vertigo, 79

Baer, B. F., 26, 27
Baldy, J. M., 14, 46
Bones, carcinoma of, 206
Brain, abscess of, 159
Brain-tumors, 79
Brinton, J. H., 196, 198
Bullet located by skiagraphy, 197
Burnett, Charles H., 79

Carbolic acid, surgical uses of, 90
Carcinoma of bones, secondary, 206
Carcinoma of descending colon, 170
Cerebellum, tumor of, 141
Cervix uteri, congenital erosion and split of, 18
Cholecystotomy, 242
Cohen, J. Solis, 151
Congenital erosion and split of the cervix uteri, 18

Da Costa, J. M., 88, 132, 139, 140
Daland, Judson, 186
Davis, Edward P., 36, 46, 111
Dercum, F. X., 1, 12, 85, 150
De Schweinitz, George E., 73
Displacement of shoulder and hip, 188

Eshner, A. A., 120, 215, 226, 227, 228
Eye-symptoms of intracranial tumors, 47
Exhibition of specimens, 195

Fisher, H. M., 245
Floating liver and distended gall-bladder mistaken for a floating kidney, 242
Foreign body in larynx, 228
Functions of the neuron, 1

Graphic study of tremor, 215
Griffith, J. P. Crozer, 131, 152, 169
Gynecology, report of section on, 255

Henry, F. P., 120, 130, 139, 140, 226
Hinsdale, Guy, 228
Hypodermic use of iron, 132
Hysterectomy, supravaginal, 27, 36
Hysteria and hypnotism, phenomena presented by, 1

Imperfect closure of the auricular and ventricular septa from abscess of brain, 159
Infantile scurvy, note on, 199
Intracranial tumors, 47, 56, 67, 73
Intracranial tumors, diagnosis of, 67
Intracranial tumors, surgical treatment of, 56
Intrapelvic treatment of stump, 27
Iron, hypodermic use of, 132

Keen, William W., 56, 104, 149, 240, 241, 242

Larynx, foreign body in, 228
Le Conte, Robert G., 197
Leidy, Joseph, Jr., 199, 205
Library committee, report of, 250
Liver, movable, 230
Lloyd, J. Hendrie, 83, 141, 150

Magie, William Francis, 97
Mathews, Franklin, 195
Meigs, A. V., 139, 169, 205
Mills, Charles K., 12, 67, 89, 150
Mitchell, S. Weir, 149
Montgomery, E. E., 26, 45
Morton, Thomas S. K., 140, 170
Movable liver, case of, 230
Musser, John H., 170, 206
Mütter Museum, additions to, 249

Neuron, functions of, 1
Norris, William F., 47

Ocular phenomena in their relation to intracranial growths, 73
Ophthalmology, report of Section on, 251
Otitic brain-abscesses, 79
Otology and laryngology, report of section on, 253

Packard, Frederick A., 159, 187, 205, 230
Penrose, Charles B., 17, 18, 45, 118, 120
Perforate septum ventriculorum, case of, 152

Roberts, John B., 95
Röntgen rays, clinical application of, 97, 104, 111
Röntgen rays, study of infant's body by, 111
Röntgen rays, study of pregnant womb by, 111

Scurvy, infantile, 199
Shober, John B., 174, 187
Shoemaker, George R., 26, 96
Shoulder and hip, displacement of, 188
Sinkler, Wharton, 121, 131
Skiagraphy, bullet located by, 197
Specimens, exhibition of, 195
Stump, intrapelvic treatment of, 27
Suppression of urine of long standing without symptoms of uræmia, 121
Supravaginal hysterectomy for impossible labor, 27, 36
Surgical injury to ureter, 14
Surgery, report of section in general, 257
Surgical uses to which carbolic acid of official strength has been applied, 90

Temperature-chart, presentation of an unusual, 118
Thomson, William, 88
Thoracic aneurism, case of, 174
Transposition of viscera, 245
Tremor, a graphic study of, 215
Tumor of cerebellum, 141
Tumors, intracranial, 47, 56, 67, 73
Tyson, James, 241, 248

Ureter, surgical injury to, 14
Urine, suppression of, without symptoms of uræmia, 121

Viscera, transposition of, 245

Warren, Joseph W., 227

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